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Branching Restrictions, Financial Market Integration, and Firm Growth: Evidence from U.S. Banking Deregulation*

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Abstract

I argue that legal restrictions on bank entry and expansion result in inadequate levels of financial integration that leave firms and workers vulnerable to local credit supply shocks. Examining the history of intra and inter-state bank-branch deregulation in the United States, I show that branching restrictions limited financial integration. This resulted in inefficiently high levels of expansion and contraction by firms in response to variations in local credit supply. My results suggest that, as a matter of industrial policy, countries should attempt to lower barriers to entry and expansion for commercial banks both within and across their borders. They also suggest that these restrictions on banks increase the employment uncertainty of workers in mid-sized firms and thus raise the cost of entrepreneurial activity. To substantiate these claims, I first develop a model in which an increase in financial integration—the ability of a market to draw on funds from other markets—insulates credit-constrained firms from the impact of local credit supply shocks. I then test the model’s predictions by estimating the marginal reduction in the dependence of business growth on local credit growth after an increase in financial integration. I find that intra-state deregulation results in an 80% reduction in the effect of local credit supply growth on mid-sized establishment growth (20-99 employees) in metropolitan statistical area (MSA) markets and that inter-state deregulation has a similar effect for such establishments in non-MSA markets. I find effects of similar magnitude using employment growth and payroll growth as measures of firm growth. These results are robust to a variety of econometric specifications.

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I Introduction

What are the economic effects of legal and regulatory barriers that limit the financial integration of markets? This question remains salient for scholars of law and economics despite the liberalization of trade in financial services over the last several decades. Markets in Asia, the Middle East, and the former Soviet Union continue to maintain legal and regulatory hurdles to entry and asset ownership by foreign banks. As these countries attempt to remove or even further construct such barriers in response to economic forces that increase their interconnection with the global economy, the potential consequences for economic growth, income distribution, and business cycle volatility will be significant [Barth, Caprio, and Levine, 2006].

Removing such barriers also involves coordinating the conflicting interests of competing jurisdictions and of competing stakeholders within those jurisdictions. Allowing the entry of foreign banks, for example, may benefit domestic borrowers but will threaten the bottom line of competing domestic banks. If domestic banks are also allowed to access foreign markets, then this may help domestic banks looking to expand, but harm domestic borrowers if their lenders can now seek higher returns abroad. The presence of foreign financial institutions can enable domestic economies to weather local credit shocks. They can also act as a conduit for importing financial contagions. Legal and regulatory changes involve strategic considerations both within and across jurisdictions, and the dynamics of this strategic interaction can be complex.

To understand the costs and benefits of legal barriers to financial integration and to understand the political economy of raising and lowering these barriers, the historical experience of the United States can offer useful lessons. The banking markets of the United States remained relatively isolated over much of the twentieth century, and their integration through large, regional and national banks and bank holding companies is a phenomenon of the last thirty years. The dual regulatory system, with responsibility placed in both state governments and the Office of the Comptroller of the Currency (OCC), allowed for significant state level variation in banking laws [Macey and Miller, 1992]. The federal government did, appurtenant to FDIC deposit insurance, exercise significant control over almost all commercial banks, but states were still free, along some dimensions, to compete for bank charters through their banking laws. As a result, states modified their banking laws at different points in time. The history of banking in the United States thus serves as a convenient laboratory in which to examine the dynamics of bank regulation and deregulation in a multi-jurisdictional setting.

In this paper, I provide new evidence on the relationship between legal rules, financial

market structure, and firm growth by using a natural experiment to estimate the effect of local credit supply on business formation in more and less integrated commercial banking markets. I hypothesize that in markets that are not financially well-integrated, the supply of bank credit to firms is limited by locally available funds. In such markets, firm investment should exhibit greater sensitivity to variations in local credit supply. This sensitivity should be greater for smaller firms and firms in sectors with a greater need for external finance. To test this hypothesis, I make use of the history of bank regulation in the United States. I examine whether states that lifted restrictions on intra and inter-state bank branching lowered the dependence of business growth on credit supply growth. By exploiting the differential timing of state deregulation, I am able to trace the causal channel that runs from legal restrictions on bank expansion to financial integration and firm growth.

I find that restrictions on bank branching reduced the ability of mid-sized firms to adjust to local credit market shocks. I conclude from these findings that barriers to bank entry and expansion that lead to fragmented banking markets have adverse consequences for small business growth and for entrepreneurial activity. These costs have to be set against the gains that potentially follow from protecting local markets from external shocks transmitted through the banking channel. I also conclude that, whatever the independent merit of “too big to fail” arguments as applied to bank holding companies with activities that cut across commercial banking, insurance, securities underwriting, and investing, much of the consolidation that has taken place over the last three decades within U.S. commercial banking has been beneficial. This point bears emphasis in a political environment in which a large-scale restructuring of financial regulation is potentially on the table.

My findings have implications for the literature on jurisdictional competition in corporate and banking law. As Jonathan Macey has argued, the extensive federal power to regulate banks limits the extent to which states can engage in competition for bank charters [Butler and Macey 1988; Macey 2006]. Nevertheless, bank branching can be seen as one regulatory domain in which, over time, states converged to policies that led to greater efficiency in the lending market. These findings are consistent with Macey’s [2006] observation that state banking regulations tend to introduce protectionist distortions in the banking market. They also suggest that future research examining in detail the legislative history of deregulation, coupled with statistical evidence on the determinants of deregulation, can identify conditions under which regulatory competition leads to beneficial outcomes [Kroszner and Strahan 1999]. Such research could contribute to a useful typology of the dynamics that characterize jurisdictional competition in different areas of commercial law—such as corporate governance, securities regulation, and banking [Jackson 2001; Gadinis 2008].

This paper complements and extends the existing studies of the effects of financial market integration on firms. First, I provide a unifying, causal mechanism for previous studies

that have shown a reduced-form relationship between the geographic deregulation of banking and (1) a decrease in the amplitude of state business cycles and (2) a shift the size and sectoral distribution of firms at the state level toward medium sized and credit reliant firms. Unlike these studies, there is a direct relationship between the econometric specifications I employ and the underlying model. This direct relationship between hypothesis generation and testing renders alternative mechanisms that could rationalize the data less plausible. I also identify the important role played by the internal capital market structure of banks and bank holding companies in integrating markets within and across states, an issue that the previous literature ignores.

Second, in contrast to previous studies that estimate the effects of deregulation at the state level, I test my hypotheses at the MSA (Metropolitan Statistical Area) and non-MSA market (county) level. Market-level estimation presents a number of advantages. It is consistent with evidence that the relevant geographic market for credit for small to medium-sized firms is local. It allows me to separately identify the effects of integration across urban and rural markets. These effects are of particular interest given the possibility that increased financial integration induces capital flight from markets where investment opportunities were previously limited. Market level estimation also enables me to use inter and intra-state branching deregulation, respectively, to infer the relative importance of across-state and within-state integration. From an econometric perspective, market-level estimation allows me to condition on common shocks to firm growth—the dependent variable of interest—in a given state in a given year. This helps to alleviate the concern that the endogeneity of the timing of deregulation could bias the estimates. I am able to control for market-specific economic conditions and financial structure, as well as utilize a far greater number of observations over the period of interest. I am also able to employ more realistic clustering assumptions on the correlation structure of the data. This mitigates the difficulties that arise in obtaining consistent standard errors in state-level panel studies [Bertrand, Duflo, Mullainathan 2004].

My results suggest an important economic channel running from the integration of financial markets to the volatility of firm growth, the composition of new and exiting firms in a market, and the size distribution of firms in the market. They also provide a framework for future research that (1) attempts to measure whether financial market shocks have a larger effect on firms in integrated banking markets, and (2) examines the effects of financial integration by using data that matches firm and loan characteristics to those of banks. Section II provides a summary of results, Section III situates the methodology and results in the context of the previous literature, Section IV presents the basic model and its predictions, Section V details the historical background of deregulation and summarizes the data, Section VI conducts the empirical analysis, and Section VII concludes.

II Summary of Results

I first present a simple model to illustrate my hypothesis that (1) when the supply of bank credit is limited to locally available funds, firm investment exhibits greater sensitivity to variations in local credit supply, and (2) this sensitivity declines when banks can draw on funds in other markets. My model also predicts that this effect should be stronger for firms with fewer assets and in sectors with a greater need for external finance. I then provide empirical support for these predictions. I demonstrate that intra and inter-state deregulation led to an increase in financial integration, defined as the effective deposits available to a market. I show that intra-state deregulation led to an increase in within-state financial integration and that inter-state deregulation led to an increase in across-state financial integration. I also identify the different institutional mechanisms by which this process occurred. Within-state integration took place at the level of the banking corporation. The effective funds that a market could draw on increased when measured by the internal capital market structure of multi-market banks. Across-state integration, by contrast, took place at the bank holding company (BHC) level.

After providing evidence for a link between branch deregulation and financial integration, I use a generalized difference-in-differences approach to estimate the relative change in the relationship between local credit supply growth and firm growth after deregulation. I estimate this effect across establishment size categories in order to test whether the effect is stronger for smaller firms and for firms that are more reliant on external finance. I use the growth rate of market deposits as a proxy for the local supply of credit. My estimates suggest that for establishments with 20 to 99 employees, intra-state deregulation lowered the association between local credit supply and business growth in MSA markets and that inter-state deregulation did so in non-MSA markets. It is likely that this effect occurs on the intensive margin of growth, as firms increase or decrease in size in response to credit supply movements. It is possible that there is an effect on the extensive margin. These results are qualitatively consistent with my model's predictions. The marginal firm affected by credit constraints in an unintegrated market is neither so small that it cannot obtain external finance nor so large that it can turn to the debt market. They also suggest that within and across-state capital flows differentially affect the credit-growth nexus in urban and rural markets.

The effects are of economic significance. For intra-state deregulation, the magnitude of the effect of deposit growth on establishment growth is 80% smaller than it was in the regulated period. For the average MSA market, I compute the pre and post-regulation effect on the growth rate of establishments of a fall of .05 in the growth rate of deposits. After deregulation, this fall is associated with a loss of about 7 fewer establishments than it is before deregulation. This represents 12% of new business formation in the average

MSA. When I perform the same calculations for the effect of inter-state deregulation, the magnitude of the effect of deposit growth on establishment growth is 80% smaller after deregulation. For the average non-MSA market, a fall of .05 in the growth rate of market deposits is associated with a marginal reduction in the loss of establishments that is 12.5% of new business formation. I conclude that, for this size class of firms, both types of deregulation led to a significant decrease in the importance on local credit supply at the margin of establishment growth. I find no evidence, however, that this effect varies systematically by firm sector (manufacturing, services, retail, wholesale, and construction.)

As an alternative identification strategy, I estimate the effect of the interaction between the growth rate of deposits and financial integration on establishment growth using IV regression. To measure within-state integration, I use data on multi-market banks and BHCs to compute total market deposits as a fraction of available state deposits. For across-state integration, I compute the available state deposits as a fraction of available national deposits. I then use intra-state and inter-state deregulation to instrument for these measures of within and across-state financial integration. The IV results are consistent in sign and magnitude with the results obtained using the differencing approach. I also use difference-in-differences and IV approaches to estimate the effects of credit supply on firm growth using employment growth and payroll growth as dependent variables. The differencing approach again yields results that are consistent in sign and magnitude with the results using establishment growth. The IV results, in contrast, suggest that within and across-state financial integration reduce the dependence of firms on local credit in both MSA and non-MSA markets. I conclude that the that IV approach is less able to distinguish the effects of inter and intra-state deregulation because the two are likely to be correlated.

My findings suggest that the excess volatility in firm growth in unintegrated markets may entail significant allocative inefficiencies. It is likely that these effects occur on the intensive margin of growth. Negative shocks to local credit supply trigger inefficiently large reductions in firm size, while positive shocks trigger inefficiently large expansions. These growth effects on the labor margin are consistent with evidence on labor flows that occur in response to state-specific shocks [Blanchard and Katz 1992]. It is also possible that the effects occur on the extensive margin, in which case negative shocks result in the exit of firms that could survive with additional finance, and positive shocks result in the entry of firms that should not be financed.

There are two major objections to my empirical approach. First, it is possible to argue that state legislation abolishing inter or intra state-branching restrictions is a consequence of unobserved factors that make local investment opportunities more attractive to outside capital. These unobserved factors are responsible for the measured fall in correlation

between local credit supply and business growth after deregulation. I attempt to deal with this problem by estimating the long-run effect of the legislation, which minimizes the impact of business-cycle-specific causes for deregulation. I also estimate the econometric model using state-year indicator variables, which partial out any unobserved effects that are common to all markets in a state in a given year. This still leaves the estimates vulnerable to biases from market-specific, unobserved factors that cause outside interest in local investment. However, it is difficult to give a plausible explanation for why such factors would be correlated with deregulation, but sufficiently heterogeneous in their impact on the state's markets to cause large biases.

Second, one can argue that because the observed rates of increase in deposits and firm growth are equilibrium phenomena, deposit growth cannot be interpreted as a shift in the supply of credit. Market level shocks to supply and demand for capital are likely to be positively correlated, so a reduced form estimate of the effect of deposit growth on establishment growth will be upwardly biased.. To this objection I provide three responses. First, my difference of difference approach mitigates this concern. If the source of bias from the co-movement of supply and demand is conditionally identical across markets, then it is partialled out in the estimation. Second, the use of market covariates to control for demand conditions allows me to estimate changes in the effect of credit supply (deposits) on firm growth that are relatively more influenced by the supply side than the demand side. Third, as I later show in more detail, my model predicts that credit demand growth that is positively correlated with supply growth biases my coefficients in the opposite direction of my predicted effects. Intuitively, in integrated markets the effect of negative/positive shocks to the demand for capital on business growth is exacerbated rather than dampened because capital flees/floods the market seeking higher returns.

III Previous Literature

This paper lies broadly in the law and finance literature, largely associated with LaPorta and his coauthors, who argue that legal origins, and their attendant set of rules and practices, determine financial development [LaPorta et al 1997, 1998, 2000]. These papers, while controversial in their methodology and substantive findings, have generated an ongoing empirical literature that has enriched our understanding of how legal rules, institutions, and enforcement affect financial development. The initial dissatisfaction with the early papers in this literature, consisting largely of cross-country studies using macroeconomic variables and indices of legal rights, have led to impressive efforts to obtain detailed, comparative data on legal institutions and performance [Djankov et al 2002, 2003, 2007, 2008]. They have also led researchers to look for more convincing ways to identify causal effects by focusing on changes in specific laws [Haselmann, Pistor, and Vig 2008].

This paper also contributes to the long-standing debate in economics on the relationship between financial institutions and firm growth. In his “Theory of Economic Development,” Joseph Schumpeter emphasized the role of financial institutions in identifying and promoting innovative technologies, ideas, and business methods [Schumpeter 1969]. Joan Robinson, in contrast, argued that financial institutions played little role in inducing growth, and that the development of such institutions was a natural consequence, as opposed to a cause, of a growing economy [Robinson 1952]. The systematic empirical investigation of this question extends back to at least Goldsmith [1969], who pointed out a persistent correlation between economies with high growth levels and developed financial institutions. As in the law and finance literature, the empirical difficulty in this area has been to identify plausibly exogenous changes in the characteristics of financial institutions in order to consistently estimate their impact. As a result of these difficulties, the mechanism through which legal and financial structure impact business formation, investment, and growth, as well as the magnitude of these effects, remain a subject of considerable debate.

A considerable body of econometric work, relying on identification arguments in the tradition of Granger, has sought to demonstrate that high measures of financial development at a given point in time are correlated with future growth in per capita income [King and Levine 1993]. A parallel line of research in finance and in industrial organization has tried to exploit determinants of external financial dependence in order to measure the differential impact of financial development on more and less financially-constrained sectors [Rajan and Zingales 1998, 2001]. While these studies provide suggestive evidence of a causal arrow running from finance to growth, the omitted variables and simultaneity problems associated with cross-country regressions, as well as the instability of the estimates across regression specifications limit the conclusions that can be drawn from them [Malmendier 2008]. As a result, empirical researchers have looked for plausibly exogenous variation in the characteristics of a financial regime in order to estimate the effect of a change in these characteristics on economic performance, variously defined.

Jayaratne and Strahan [1996] represent a qualitative step forward in the empirical identification of a “finance-growth nexus.” The authors are the first to exploit the natural experiment created by the removal of intra and inter-state bank branching restrictions by U.S. states from the 1970s to the 1990s. Using a difference-in-differences approach, they find that the per capita growth rates of income and output increased in states after intra-state branching deregulation. While these findings are consistent with a causal effect running from bank deregulation to growth, the authors do not identify the economic mechanism through which this effect might occur. Subsequent research, much of it by Strahan, has attempted to more carefully decompose these effects and place their causes on solid micro-foundations.

Black and Strahan [2002] estimate the effect of intra and inter-state branch deregulation on new incorporations. They hypothesize that deregulation encourages business formation by reducing entry barriers, facilitating the take-over of struggling banks, and consolidating banking enterprises, all of which reduce the power of incumbent firms and lower the cost of credit. Using state level panel regressions, the authors find that inter-state deregulation led to an increase of about 6 percent in the number of new incorporations per capita. The authors find that intra-state branch deregulation has no effect on new incorporations.

Cetorelli and Strahan [2006] estimate the effects of intra and inter-state branching deregulation on the total number of establishments per capita and the average number of employees per capita. The authors argue that deregulation leads to an increase in bank competition that affects the difference between the average number (and size) of establishments in financially constrained and unconstrained industries. They find that, after inter-state deregulation, the average number of establishments in financially dependant sectors increases relative to that of less dependant sectors. Under the same test, they find that average establishment size decreases. The authors also show a differential shift in the establishment size distribution after inter-state deregulation. Relative to less finance-dependent sectors, the fractions of establishments with fewer than 5 employees and from 100-999 employees falls, while the fractions from 5-19 employees and 20-99 employees rise.

Morgan, Rime, and Strahan [2004] provide evidence that economic volatility decreased in states after inter-state banking deregulation due to increased financial integration. For their measures of integration, the authors construct (1) an inter-state asset ratio—the fraction of banks assets in a state owned by out of state holding companies—and (2) an other-state asset ratio—the total amount of assets held out of state by banks in that state divided by the state’s assets. Instrumenting for these measures using indicators for inter- and intra-state deregulation. They find that increases in both measures of integration are associated with a decline in volatility, measured as the absolute deviation of unemployment, personal income or gross product growth rates relative to their trend.

To summarize, in what has been the most convincing empirical setting in which to identify the effects of a large and plausibly exogenous change in financial market institutions, there is state-level evidence that (1) new incorporations increased and that, relative to less financially dependent sectors, (2) the average size of firms decreased and (3) the average number of firms increased. There is also state-level evidence that GDP growth increased and aggregate volatility decreased after deregulation. The literature has yet to identify the economic mechanism through which these reduced-form effects that appear to accompany deregulation occurred. In the context of U.S. bank deregulation, this paper is the first to propose a mechanism through which financial market integration directly effects the credit constraints faced by firms at the market level, predict the differential outcomes across

size and external finance dependence that follow from these constraints, and test these predictions at the market level.

IV An Illustrative Model of Financial Integration

I develop a simple equilibrium model of firms who can access unmonitored debt capital and capital from banks that monitor their borrowers. The informational asymmetry between firms and lenders who do not monitor leads to credit rationing, which affects small firms and/or firms that are reliant on external finance. Capital constrained firms can acquire more expensive capital from a bank, which alleviates their incentive constraint and allows them to raise a larger total of external funds. I analyze the equilibrium for a single market and compare this to two markets where bank capital moves freely to equate the cost of bank finance across markets. The main results are that (1) shifts in the supply of bank credit have the largest effect on marginal firms who have just enough capital/cash to acquire finance, and that (2) financial integration dampens the quantity effects of shocks to credit supply, but exacerbates the quantity effects of shocks to credit demand. The model is an adaptation of Holmstrom and Tirole [1997] to the context of financial integration along the lines of Morgan, Rimes, and Strahan [2006].

Debt Market Lending with No Monitoring

The economic environment consists of firms, banks, and outside investors who cannot monitor the firm's effort level. Throughout, I assume all agents are risk neutral. Each firm has a project that requires I units of capital and has outcome $\{R, 0\}$. Firms have a positive level of assets A , where A is continuously distributed according to $F(A)$. If a firm takes effort e then return is high with probability p_h . If the firm takes effort 0, then the return is high with probability p_l . An optimal contract takes the form of a debt payment R_d if return is high and 0 otherwise, so the firm keeps $R_f = R - R_d$. I assume high effort is socially optimal. The incentive compatibility constraint for the firm is:

$$p_h R_f - e \geq p_l R_f \Rightarrow R_f \geq \frac{e}{p_h - p_l}$$

This implies that the maximum return for investors in expectation is $p_h \cdot (R - \frac{e}{p_h - p_l})$.

Investors have access to an outside investment option with return r_d . This implies that a given firm can only meet its external finance needs if

$$p_h \cdot (R - \frac{e}{p_h - p_l}) \geq r_d(I - A) \Rightarrow A(r_d) \geq I - \frac{p_h}{r_d}(R - \frac{e}{p_h - p_l})$$

The information asymmetry between firms and outside investors leads to credit rationing so that only firms with assets or collateral greater than $A(r_d)$ can obtain external finance. I interpret the condition on $A(r_d)$ to hold that small firms or firms that are heavily reliant on external finance can be capital-constrained due to information asymmetries. It also follows that in the event of an increase in r_d , such financially constrained firm will be the first to be rationed.

Bank Lending with Perfect Monitoring

I next assume that a firm can also borrow from a bank with a monitoring technology. The bank can pay a cost c and perfectly observe the borrower's effort. Letting the payment from firm to the bank be R_b , the borrower's participation constraint and the bank's incentive compatibility constraint are:

$$p_h R_f - e \geq 0 \Rightarrow R_f \geq \frac{e}{p_h} \quad (IR \text{ firm})$$

$$p_h R_b - c \geq p_l R_b \Rightarrow R_b \geq \frac{c}{p_h - p_l} \quad (IC \text{ bank})$$

I can then define a rate of return for bank, or monitoring capital $r_b = \frac{p_h R_b}{I_b}$ where I_b is the amount of capital lent. Substituting for R_b in the IC constraint for the bank, it follows that:

$$I_b(r_b) \geq p_h \cdot \frac{c}{p_h - p_l} \cdot \frac{1}{r_b}$$

This condition will hold with equality because the firm will not want to borrow any more capital than necessary from banks ($r_b > r_d$ as shown below). Conditional on borrowing from a bank, a given firm can acquire unmonitored, external funds if:

$$\begin{aligned} p_h \cdot \left(R - \frac{c}{p_h - p_l} - \frac{e}{p_h} \right) &\geq r_d \cdot (I - A - I_b(r_b)) \Rightarrow \\ A(r_d, r_b) &\geq I - I_b(r_b) - \frac{p_h}{r_d} \cdot \left(R - \frac{c}{p_h - p_l} - \frac{e}{p_h} \right) \end{aligned}$$

This expression implies that $A(r_d, r_b)$ is increasing in both interest rates. Monitoring will allow more firms to access capital if $A(r_d, r_b) < A(r_d)$. This cannot hold if r_b is too high, but r_b must be high enough to satisfy a participation constraint for the bank. Intuitively, by contracting with a bank who can monitor its effort, the firm relaxes its own incentive compatibility constraint, and can thus pledge more money to outside investors.

In this model the bank is a pure financial intermediary and owns no capital. As a consequence, there exists an agency relationship between banks who possess a monitoring technology, and depositors who own capital but cannot observe payments from firms to the bank. The informational asymmetry in this agency relationship will create a cost of delegation, but the bank will be able to “diversify” this cost away by adding independent risks to its portfolio of firms. The optimal contract between the bank and depositors will also provide the bank with incentives to monitor its borrowers. As shown by Diamond [1984], an optimal contract between the bank and depositors with imperfect information approximates an optimal contract with no agency costs if the bank makes a large enough number of loans to firms with independent, or conditionally independent, returns. Relying on this result, I limit attention here to the perfect information case. If depositors could perfectly observe the bank’s cash flows, then the participation constraint for the bank would be:

$$p_h \cdot \frac{c}{p_h - p_l} - c \geq r_d \cdot I_b(r_b) \Rightarrow r_b \geq r_d \cdot \frac{p_h}{p_l}$$

Recall that monitoring will allow firms more access to capital if $A(r_d, r_b) < A(r_d)$. Under perfect information, a sufficient condition that will guarantee $A(r_d, r_b) < A(r_d)$ at the minimal level of r_b is that $\frac{p_l}{p_h - p_l} \cdot e - c > 0$. Intuitively, bank finance can increase a firm’s access to capital if the costs of monitoring are not too high.

Single Market Equilibrium with Bank and Debt Finance

I let the inelastic local supply of deposits to banks be K_b and exogenously fix the price of unmonitored credit at r_d so that there is an infinitely elastic supply of unmonitored capital. Demand for bank capital is given by:

$$D_b(r_d, r_b) = [F(A(r_d)) - F(A(r_d, r_b))] \cdot I_b(r_b)$$

For fixed r_d it is immediate that $D_b(r_d, r_b)$ is strictly decreasing in r_b so demand for bank finance is downward sloping. I further assume that $D_b(r_d, r_d \cdot \frac{p_h}{p_l}) \geq K_b$ which guarantees that supply does not exceed demand at the minimum price $r_b = r_d \cdot \frac{p_h}{p_l}$. It follows that the equilibrium value of r_b is given by $D_b(r_d, r_b) = K_b$. This equation also determines the market demand for unmonitored debt capital:

$$D_d(r_d, r_b) = \int_{A(r_d, r_b)}^{A(r_d)} [I - A - I_b(r_b)] f(A) dA + \int_{A(r_d)}^I [I - A] f(A) dA.$$

I am then in a position to carry out the comparative statics of this model. Proofs and further discussion are contained in the Appendix.

Proposition 1 *An increase/decrease in the local supply of capital lowers/raises the equilibrium price of bank finance and increases/decreases the equilibrium quantity of bank capital.*

Proposition 2 *An increase/decrease in the demand for bank capital raises/lowers the equilibrium price of bank finance but leaves the equilibrium quantity of capital unchanged.*

Figure 1a presents a graphical interpretation of the single market model. A negative shock to the supply of local capital (Figure 1b) raises the equilibrium price of bank credit and lowers the demand for bank capital. The effect of this shock on the demand for unmonitored debt capital is ambiguous (Figure 1c). The number of firms who can access external finance falls, but the amount of unmonitored debt capital per firm increases. The total demand for finance (bank plus debt) decreases, and the marginal firms that lose access to finance are those with the smallest level of assets or, alternatively, those with the greatest need for external finance. The effect of a demand shift is also clear from the graph. A negative shock to the demand for bank capital lowers the equilibrium price of bank credit, but leaves the equilibrium quantity unchanged.

Equilibrium in Two Integrated Markets

I then use the above model to consider the effects of financially integrating two previously distinct markets. For simplicity, I assume there are two symmetric markets. None of the qualitative results depend on this symmetry assumption. I also assume that the markets for bank capital are perfectly integrated so that bank capital moves freely across both markets to equalize the rate of return. Let the local stock of capital in markets one and two be K_{b1} and K_{b2} . The equilibrium across both markets is now defined by:

$$\begin{aligned} D_{b1}(r_d, r_{b1}) &= \theta \cdot (K_{b1} + K_{b2}) \\ D_{b2}(r_d, r_{b2}) &= (1 - \theta) \cdot (K_{b1} + K_{b2}) \\ r_{b1} &= r_{b2} = r_b \end{aligned}$$

where θ defines the fraction of total monitored capital employed in a given market.

Proposition 3 *In an integrated market an increase/decrease in the local supply of capital lowers/raises the equilibrium price of bank finance and increases/decreases the de-*

mand for bank capital, but the price and quantity effects are smaller than in an unintegrated market.

Proposition 4 *In an integrated market, an increase/decrease in the demand for bank capital raises/lowers the equilibrium price of bank finance, but the price effects are smaller than for an unintegrated market.*

Proposition 5 *In an integrated market, an increase/decrease in the demand for bank capital increases/decreases the equilibrium quantity of bank capital, but the quantity effects are larger than for an unintegrated market..*

In other words, supply side and demand side credit shocks have different consequences for volatility after integration. The quantity effects of shocks to local credit supply are muted in integrated markets, while the quantity effects of credit demand shocks are exacerbated. The price effects of both supply and demand shocks are, of course, muted in integrated markets. These comparative statics are easily shown in a diagram. Figure 2 shows two integrated markets in an initial equilibrium. The parameter θ captures the free movement of bank capital that equates the price of bank finance across both markets. In Figure 3, a negative shock to the supply of bank capital in market one raises the price of bank finance. Bank capital from market two then enters market one until the price of bank finance is equated across both markets (Figure 4). A negative shock to bank capital therefore raises the equilibrium price and lowers the equilibrium quantity of bank capital, but both effects are smaller in magnitude in an integrated market than in a single market.

A demand shock in an integrated market also lowers the equilibrium quantity of bank capital, but effect is larger in magnitude than in a single market. Figure 5 depicts a negative shock to the demand for bank capital in market one, which lowers the price of credit. In Figure 6, capital is reallocated from market one to market two, equating the cost of bank finance. Recall the single market case exhibits no quantity effect from a negative shock to demand because of inelastic supply. In an integrated market, this effect is negative. In general, the quantity effects of shocks to demand are larger in integrated markets.

The comparative statics of the model can be applied to the context of intra and inter-state deregulation. The model suggests that the relationship between shifts in local credit supply and firm growth should be stronger in regulated states than in deregulated states, and that this association should decrease after deregulation. The model also suggests that this effect should be most pronounced for marginal firms that either lack the requisite assets to pledge against their loans or exhibit high demand for external finance.

V Historical Background and Data

In order to test this model, I exploit the history of bank regulation in the United States. I briefly outline the history of inter and intra-state branching restrictions in the United States in order to highlight the causal factors behind deregulation that my empirical analysis must take into account. For most of the twentieth century, the United States consisted of at least 50 different banking markets. This fragmented system was maintained, in part, through legal restrictions on inter-state bank expansion. State chartered banks could not establish branches in other states. National banks were also restricted by their charters and by OCC policy to individual states and had limited branching rights within those states [Calomiris 2000]. National banks were placed on an even footing with state banks by the McFadden Act of 1927, which permitted national banks, with limitations, to establish branches within a state if state law permitted.

Inter-state banking was virtually nonexistent in the United States until after the Glass-Steagall Act of 1932. Subsequently, bank holding companies (BHCs) began to operate across state lines by purchasing banks with different state charters. The Douglas Amendment to the Bank Holding Company Act of 1956, prevented this practice by precluding out-of-state banks or BHCs from making acquisitions without the target state's approval. Because no state permitted out-of-state acquisitions at the time, the Douglas Amendment effectively outlawed inter-state banking organizations. Inter-state banking became a reality largely through the actions of individual states. Beginning with Maine in 1978, states passed laws allowing BHCs to make in-state acquisitions, and by 1994 all states except Hawaii had adopted such agreements. The federal government also facilitated this process of integration. In 1982, in response to instabilities in the banking sector brought on by mismatches between long-term, low-interest-rate assets and short-term, inflated liabilities, Congress passed the Garn St. Germain Act, allowing failed banks and thrifts to be acquired by any BHC. Congress finally allowed nation-wide branching with its passage of the Riegle Neal Act in 1994.

While inter-state branching restrictions limited across-state financial integration, intra-state branching restrictions limited within-state financial integration. The debate over intra-state bank branching holds a venerable place in U.S. financial history. State-chartered banks in the eighteenth and early nineteenth centuries were usually prohibited from establishing branches by their charters. Southern states were the exception to this rule. Banks were often granted branching rights within their charters, and the greater resilience of the southern banking system was attributed to its extensive branch networks [Calomiris 2000]. Branch banking declined in the South after the Civil War, but resurfaced in the North with the movement for banking consolidation following the widespread bank failures of the 1890s. California's decision to liberalize its branching laws in 1909 also served as an example to

other states [Chapman & Westerfield 1942]. From the 1920s to the mid 1930s a considerable number of states eased their restrictions on branching [Dehejia and Lleras-Muney 2007]. Calomiris [2000] argues that states did so in response to bank failures. Dehejia and Lleras-Muney [2007] show that states who adopted bank reforms in this period chose either to ease branching restrictions or to adopt deposit insurance. They find some statistical evidence that states chose branching or deposit insurance in response to economic downturns and that states with large manufacturing establishments were more likely to adopt branching reform.

There was little change in branching laws from the 1940s to the 1970s. By 1975, only fourteen states allowed banks to freely branch within the state, and a total of 18 “unit” branching states went so far as to restrict bank branching altogether. From 1975 to 1994, almost all states lifted their restrictions on intra-state branching. Kroszner and Strahan [1999] provide evidence that deregulation occurred earlier in states with smaller and weaker small-banking sectors, and in states with a larger fraction of small, bank dependent firms. They find no evidence that states deregulated in response to bank failures or distress. The legislative process through which deregulation occurred varied across states. Some states first allowed BHCs to operate multiple bank subsidiaries. These subsidiaries were treated as distinct institutions that had to separately comply with state regulations such as capital and risk requirements. These states then allowed BHCs to convert their subsidiaries into branches of a single bank and to acquire new branches by merger and acquisition.

Other states—including Texas, Florida, Mississippi, Louisiana, New Mexico, and Tennessee—lifted restrictions on branching in response to court rulings that allowed national banks to freely branch within those states [Jayaratne and Strahan 1996]. Courts interpreted the fact that these states allowed thrifts to branch to mean that national banks could do so under the McFadden Act. Because such rulings placed state commercial banks at a competitive disadvantage vis a vis national banks, these states subsequently allowed branching to level the playing field. By 1994 all states except Iowa permitted free branching within their geographic boundaries. Kroszner and Strahan [1999] suggest that, over time, ATM machines, checkable money market funds, and lower transportation costs reduced the value of the geographic monopoly over depositors held by local banks. They also argue that the introduction of credit scoring and other quantitative financial techniques reduced the informational advantages of local banks in lending to local borrowers. As a result, the benefits of branch restrictions to smaller banks were no longer worth the political costs of maintaining the status quo.

In my empirical analysis, a state undergoes intra-state deregulation when it allows banks to expand by merger and acquisition and to manage all its branches as a single commercial entity. A state undergoes inter-state deregulation when it allows banks or

BHCs outside the state to acquire in-state branches. Table 1 presents the year of inter and intra-state deregulation for each state. The sample consists of all county and MSA (Metropolitan Statistical Area) banking markets in the United States from 1977 to 1997, excluding the District of Columbia and Delaware. Table 2 summarizes the population and banking statistics for the average MSA and non-MSA market over this period. The 3-firm concentration ratio measures the fraction of bank deposits in the market held by the largest three banks or BHCs, while the Herfindahl index measures the sum of squared deposit market shares for all banks or BHCs. Despite the wave of intra and inter-state deregulation that occurred during this period, market concentration by either measure remained fairly constant. The substantial industry consolidation that took place was primarily across market rather than within market.

Table 3 illustrates the dramatic increase in the level of financial integration across both MSA and non-MSA markets using three market-level measures. To construct the “Market/State” measure, I divide the total deposits in a market by the total deposits held in-state by banks or BHCs in that market. I then subtract this fraction from one. Market/State acts as a proxy for the level of financial integration across markets within a particular state. A higher value indicates greater within-state integration. To construct the “State/U.S.” measure for a market, I divide the total deposits held in-state by banks or BHCs in that market by their total U.S. deposits. I then subtract this fraction from one. State/U.S. acts as a proxy for the level of financial integration of markets across state boundaries. Again, a higher value indicates greater across-state integration. “Multi” measures the fraction of deposits in a market held by multi-market banks or BHCs.

The integration measures in the “Bank” column assume that the branches of an individual bank (corporation) act as a single lending entity. The integration measures in the “BHC” column assume the branches of an individual BHC act a single lending entity. Whether BHCs should be treated as an integrated financial unit is an empirical question. Individual entities within a BHC must separately comply with state and national bank regulations. Depositors with funds in one bank in a BHC cannot access their funds through a different bank in the same BHC. The existing evidence [Houston, James, and Marcus 1997] suggests that BHCs constitute an internal capital market. At both the bank and BHC level, all of these measures show a marked increase in the level of financial integration over time.

The aggregate integration measures, however, conceal considerable heterogeneity across states. Table 4 contains the Market/State measures for California, Colorado, and Illinois using banks and BHCs. California allowed unrestricted intra-state branching throughout the sample period. Colorado and Illinois initially limited banks to one branch (unit branching), but eventually allowed branching through merger and acquisition in 1991 and

1988, respectively. Colorado illustrates the importance of the holding company structure to measures of integration. Within-state integration, measured at the bank level, increases over time for MSA and non-MSA markets, but is constant across MSA markets when measured at the BHC level. The data suggest that in Colorado, the BHC structure provided an imperfect substitute for financial integration within the state. In Illinois, by contrast, the Market/State measure of within-state financial integration increases dramatically over time when measured at bank or BHC level. For California, the Market/State measure of within-state financial integration, constructed using banks or BHCs, is roughly constant across time for MSA and non-MSA markets.

The BHC appears to be the preferred vehicle through which financial entities integrated across states. This can be seen through Table 5, which contains the analogous data for the State/US measure over time. California allowed inter-state banking in 1987, while Colorado and Illinois did so in 1988 and 1986, respectively. All three states evidence an increase in the across-state integration measure over time, but the effect is muted in California due to its size. This trend is more pronounced when integration is measured at the BHC level.

VI Empirical Analysis

VI.1 Deregulation and Financial Integration

I first present evidence that intra and inter-state deregulation led to an increase in financial integration. I find that intra-state bank branch deregulation led to an increase in within-state financial integration, measured at the bank level, and that inter-state deregulation led to an increase in across-state financial integration, measured at the BHC level.

This conclusion can be readily shown through the time series evidence. I first present the evidence for intra-state branch deregulation. Figure 7 depicts the bank Market/State measure for MSA Markets in Colorado as a function of time, with the vertical line at 1991 denoting the year of intra-state bank branch deregulation. There is a sharp increase in within-state integration for all MSA markets after deregulation. When the Market/State measure is computed for Colorado at the BHC level, as in Figure 8, there is little evidence of either a change in the measure over time or an effect arising from deregulation. Figures 9 and 10 depict the Market/State measure for banks and BHCs in Illinois, which undertook its deregulation in 1988. As in Colorado, within-state integration increased sharply after intra-state deregulation in Illinois when measured at the bank level. In contrast to Colorado, within-state integration also increased in Illinois when measured at the BHC level, and this trend preceded intra-state deregulation. Both Illinois and Colorado can be contrasted with California where, as depicted in Figures 11 and 12, neither the bank nor the BHC

Market/State ratio changed appreciably over time. I find these plots to be persuasive evidence that intra-state branch deregulation led to an increase in within-state financial integration when measured at the bank level.

Inter-state regulation led to an increase in across-state financial integration when measured at the BHC level. As shown in Figure 13, inter-state deregulation in Colorado in 1988 is associated with an increase in across-state integration when measured at the BHC level, with some evidence for an increase preceding deregulation. When measured at the bank level as in Figure 14, however, there is little change in across-state integration until 1995. It is likely that the increase in integration observed after 1995 is due to the Riegle Neal Act of 1994, which permitted nation-wide branching. This same pattern appears in Figures 15 and 16 for Illinois, which deregulated interstate branching in 1986. California, which deregulated interstate branching in 1987, shows no increase in its rate of integration when measured at the BHC level (Figure 17). The pattern for California's Bank State/U.S. ratio, shown in Figure 18, is similar to that for Colorado and Illinois, again suggesting the importance of the Riegle Neal Act for this measure of across-state integration. These plots are consistent with my claim that inter-state bank branch deregulation led to an increase in across-state financial integration when measured at the BHC level.

I also provide statistical evidence for the increase in integration following intra and inter-state deregulation. I estimate equations of the form:

$$y_{mst} = \alpha_m + \alpha_t + \alpha_s t + \beta_1 p_{mst} + \beta_2 p_{mst} \cdot t + \beta_3 \mathbf{z}_{mst} + \epsilon_{mst} \quad (1)$$

Each observation corresponds to a given market/state/year, where a market is defined to be a Metropolitan Statistical Area (MSA) or county for non-MSA areas. I regress integration measured at the market level (y_{mst}) on market indicator variables, (α_m), time indicators (α_t), state-specific time trends ($\alpha_s t$), an indicator for post-deregulation years (p_{mst}), a time trend for post deregulation years ($p_{mst} \cdot t$), and a vector of market and state level covariates ($\mathbf{z}_{mst}$). I estimate these models separately for MSA and non-MSA markets and for both measures of integration (Market/State and State/U.S.), using intra-state and inter-state deregulation as the treatment indicators.

Table 6 presents the evidence for intra-state regulation. The coefficients on the indicator variable for post-deregulation years are large and statistically significant for both MSA and non-MSA markets when within-state integration is measured at the bank level. In MSA markets, this increase in integration is about .18 and in non-MSA markets it is about .10. For both sets of markets, the coefficients are quite stable across specifications that include of a rich set of market and state covariates, whether these covariates are included as growth rates or logs. The trend coefficients are only significant for non-MSA markets. Table 7 presents the evidence for inter-state deregulation. The coefficients on the indicator

variable and trend variables for post deregulation years are large and statistically significant for both MSA and non-MSA markets when across-state integration is measured at the BHC level. In MSA markets, the increase in integration is about .12 and in non-MSA markets it is about .06. The coefficients for both the post-deregulation indicator and the trend variables are again stable across specifications that include market and state covariates. Both the regression results and time series plots presented in this section suggest that (1) intra-state bank branch deregulation led to an increase in within-state financial integration measured at the bank level and (2) inter-state deregulation led to an increase in across-state financial integration measured at the BHC level.

VI.2 Deregulation, Local Credit Supply, and Firm Growth

Difference-in-Differences Estimation

My model predicts that in states with intra-state branching restrictions, (1) the correlation between local credit supply and business growth is greater in regulated states than in unregulated states, and (2) this correlation decreases post deregulation. It also predicts that the correlation between local credit supply and business growth decreases after deregulation in states with inter-state branching restrictions. These effects should be greater for firms that are dependent on external bank finance. In order to measure the effect of deregulation on the relationship between local credit supply and firm growth, I estimate equations of the form:

$$y_{mst} = \alpha_m + \alpha_t + \alpha_s t + \beta_0 p_{mst} + \beta_1 x_{mst} + \beta_2 x_{mst} \cdot d_{ms} + \beta_3 x_{mst} \cdot p_{mst} + \beta_4 \mathbf{z}_{mst} + \epsilon_{mst} \quad (2)$$

I regress measures of firm growth (y_{mst}) on market indicator variables, (α_m), time indicators (α_t), state-specific time trends ($\alpha_s t$), an indicator for post-deregulation years (p_{mst}), the growth rate of deposits (x_{mst}), interactions of the deposit growth rate with a deregulating-market indicator ($x_{mst} \cdot d_{ms}$) and the post-deregulation period ($x_{mst} \cdot p_{mst}$), and a vector of market and state level covariates ($\mathbf{z}_{mst}$). This regression captures the effects of intra or inter-state bank branch deregulation on the relationship between the growth rate of deposits and the growth rate of firms. I estimate these equations separately as well as jointly for intra-state and inter-state deregulation. For inter-state deregulation, β_2 is not identified since each market deregulated during the sample period.

I also estimate these equations using state-year indicator variables to account for state-year-specific, omitted variables that affect firm growth. By including state-year indicators, I control for state-specific policies or macroeconomic conditions that directly effect firm growth and are correlated with deregulation. In these regressions, the effect of deregulation

on the credit-growth nexus is identified from variation in market deposit growth relative to the state average for that year.

My hypotheses can be stated in terms of the econometric model as follows:

$$\textit{Intra} - \textit{State Deregulation} : \beta_2 > 0, \beta_3 < 0$$

$$\textit{Inter} - \textit{State Deregulation} : \beta_3 < 0$$

I first use the growth rate of establishments in a market as a measure of firm growth and the growth rate of deposits in the market as a proxy for the local supply of credit. I estimate the model using firms of different sizes, as measured by the number of employees, in order to proxy for the level of external financial dependence. This proxy for firm growth does not distinguish new establishments started by firms already in the market from establishments by entrants. It also does not distinguish the intensive and extensive margin of firm growth. Table 8 presents descriptive statistics for the size distribution of firms across MSA and non-MSA markets during the sample period for businesses with 1-19, 20-99, and 100 or more employees. There is weak evidence that, over time, firms with 20-99 employees have increased as a fraction of all firms at the expense of firms with 1-19 employees.

I report empirical estimates of Equation 2 for MSA markets in Table 9. Columns 1-3 present estimates using state specific linear time trends and columns 4-6 present estimates with state/time indicator variables. All equations include both the intra-state and inter-state deregulation indicators. Standard errors are clustered at the state level. The coefficients are similar in magnitude and value when the effects of the deregulations are measured separately.

These estimates are consistent with the presence of financial constraints in the 20-99 employee size class in MSA markets due to low levels of within-state integration. They are consistent with the model's predictions whether the regressions contain state time trends or state-year indicators. For the estimates using state time trends, the positive coefficient of .081 on $GrBdeps \cdot Intra$ indicates that there was a stronger association between local bank deposits—the proxy for local credit supply—and establishment growth in states with intra-state branching restrictions compared to states without such restrictions. The negative coefficient of .097 on $GrBdeps \cdot Intra \cdot Post$ indicates that the relationship between deposit growth and establishment growth decreased as a result of deregulation.

The coefficient of .097 can be interpreted in two ways. First, the magnitude of the effect of deposit growth on establishment growth is 80% smaller than it was in the regulated period. Second, for the average-sized MSA market after deregulation, a fall in the growth rate of deposits of .05 is associated with a loss of about 7 fewer establishments than it is

before deregulation. Since over the sample period the number of new establishments in this size class in the average MSA is about 60, this represents 12% of new business formation. I conclude that for medium-sized firms, intra-state deregulation led to an economically significant decrease in the importance of local credit supply at the margin of establishment growth. I emphasize, however, that these regressions cannot distinguish the extensive margin of growth attributable to new establishments from the intensive margin of growth due to the expansion of smaller firms.

The estimates presented in Table 10 are also consistent with the presence of financial constraints in the 20-99 employee class due to low levels of across-state integration in non-MSA markets. The negative coefficient of .109 on $GrBdeps \cdot InterPost$ suggests that inter-state branch deregulation reduced the effect of deposit growth on establishment growth. This coefficient implies an 80% reduction in the effect of deposit growth on establishment growth compared to the regulated period. Taking a sample of 100 average-sized county markets (there are about 2250 markets in the U.S.) a fall in the growth rate of deposits of .05 is associated with a loss of about 20 fewer establishments than it is before deregulation. Since the average number of new, 20-99 employee establishments in 100 such county markets in a given year is 160, this represents 12.5% of new business formation in this size class, an economically significant effect at the margin of growth.

My model predicts that the marginal firms who gain or lose access to finance are neither so small that they are unable to obtain external finance nor so large that they can rely on debt markets. Consistent with the model, I do not find an effect for the largest and smallest size category of firms. It is possible that there is an effect on the relationship between credit supply and establishment growth at the intensive margin as establishments with 1-19 employees moving into the 20-99 employee class.

These estimates also indicate a differential effect of within and across-state financial integration on MSA and non-MSA markets. For MSA markets, intra-state deregulation reduces the dependence of mid-sized firm growth on local credit supply. This suggests that within-state financial integration led to an increase in credit flows in response to market-specific shocks. Inter-state deregulation, however, had no measurable effect in MSA markets. This suggests that, conditional on within-state integration, the financial flows enabled by across-state integration are of less importance for firm growth. For non-MSA markets, by contrast, inter-state deregulation lowered the dependence of mid-sized firms on local credit supply, while intra-state deregulation had no measurable effect. This suggests that credit flows enabled by across-state financial integration lowered the effect of local shocks to credit supply. It also suggests that regional and national banks are more willing or able to smooth the flow of credit to rural areas in response to such shocks than are state-wide banks.

It is difficult to attribute these findings to biases that result from omitted variables in the regressions. The historical literature suggests that states enacted banking regulation in response to economic downturns or to financial instability in the banking sector. Though Kroszner and Strahan [1999] dispute this finding for the case of intra-state deregulation, I accept it in order to consider the effect on my estimates. First, such downturns would not explain the greater sensitivity of business growth to deposit growth *before* deregulation. Second, it is possible that states deregulate in response to shocks to their banking sector. Outside capital then enters to meet the excess demand for credit and lowers the correlation between local deposit growth and business growth. This movement of outside capital, however, is exactly what was previously limited by branching restrictions. Third, my estimates of this effect are nearly identical when I include state-year dummies in the regression. It is difficult to see how such a shock could affect enough banking markets to cause deregulation, and still be sufficiently heterogeneous in its impact on these markets to cause large biases after partialling out this common effect.

It could also be argued that my estimates do not contain large biases, but that the causality is reversed. States deregulate in anticipation of future growth. Outside investors then respond to this growth potential, resulting in a lower association between local credit supply and growth. Under this interpretation, I should also find a direct effect of deregulation on growth. I find none. This interpretation is also largely consistent with my underlying argument that banking restrictions limit the ability of credit to move freely to equalize returns across markets.

The fact that states that deregulated later had significant, small-banking sectors does not pose a serious problem for my estimates. By including market indicators, I partial out much of this effect. The robustness of my findings to the inclusion of state-year indicators also alleviates this concern. Conceptually, this difference between regulated and deregulated states is entirely consistent with the predicted effect of integration on the sensitivity of firm growth to local credit supply.

It is also unlikely my findings are a result of using deposits as a proxy for local credit supply. It is true that, over the sample period, deposits should be a less accurate measure of the total supply of bank credit to a market. My results, however, show that deposits are a better proxy for credit supply in markets with branching restrictions, and a worse proxy after these restrictions are lifted. It concedes that this effect is not, as represented in my model, driven solely by the availability of deposits from other branches. Deregulation increases the fraction of large banks in a market. These banks have the ability to secure funds through a variety of methods, such as issuing short-term and long-term debt, selling shares, and borrowing on the inter-bank market. What is central to my argument is that such non-deposit funds be raised outside the local market. A change in composition of the

source of funds (from local to nonlocal) that arises from the changing size distribution of banks in the market is entirely consistent with the mechanism detailed in my model.

As a robustness check, I re-estimate the effect of deregulation using employment growth and payroll growth to proxy for firm growth. Table 11 reports the results for these regressions in MSA markets. I again find persuasive evidence that in MSA markets intra-state deregulation lowered the effect of local credit supply growth on firm growth. The positive coefficient of .056 on $GrBdeps \cdot Intra$ indicates that there was a stronger association between local bank deposits and employment growth in states with intra-state branching restrictions. The negative coefficient of .064 on $GrBdeps \cdot Intra \cdot Post$ indicates that the correlation between deposit growth and employment growth decreased as a result of deregulation. This represents a decrease in magnitude of about 63% of the effect of deposit growth on employment growth. For the average sized MSA market, a drop in the growth rate of deposits of .05 after deregulation is associated with a loss of about 640 fewer jobs than it is before deregulation. Since the average number of new jobs in the average MSA market is 8000, this represents 8% of employment growth. These magnitude of these effects are consistent with the estimate of a loss of 20 fewer establishments in the 20-99 employee size class. The results for the effect of intra-state deregulation on the relationship between deposit growth and employment growth are similar in magnitude when state-year dummies are included in the regression.

There is also weak evidence that inter-state deregulation led to a fall in the effect of deposits on employment growth. The coefficient of .034 on $GrBdeps \cdot Inter \cdot Post$ is statistically significant when estimated with state time trends, but is no longer significant when state-time indicators are included. Table 12 reports the analogous estimates for non-MSA markets. There is little evidence that intra or inter-state deregulation affected the relationship between deposit growth and employment growth in non-MSA markets.

The results for payroll growth in MSA markets are similar to those for employment. The positive coefficient of .099 on $GrBdeps \cdot Intra$ indicates that there was a stronger association between local bank deposits and payroll growth in states with intra-state branching restrictions. The negative coefficient of .052 on $GrBdeps \cdot Intra \cdot Post$ provides weak evidence that the correlation between deposit growth and employment growth decreased as a result of deregulation. This represents a decrease in magnitude of about 49% in the effect of deposit growth on payroll growth. For the average sized MSA market, a fall in the growth rate of deposits of .05 after deregulation is associated with a loss in payroll of around \$8,750,000 less than it is before deregulation. Since the median amount of payroll growth in the average MSA market is \$227,500,000, this represents about 4% of payroll growth. The magnitude of these effects are consistent with those observe for establishment growth and employment growth. When the regression includes state-year indicators, the

coefficient on $GrBdeps \cdot Intra \cdot Post$ is of similar magnitude, but is no longer statistically significant. As in the case of employment growth, there is little evidence that intra or inter-state deregulation affected the relationship between deposit growth and payroll growth in non-MSA markets.

Instrumental Variable Estimations

As a second identification strategy, I estimate the effect of financial integration on the relationship between credit supply and firm growth using intra and inter-state deregulation to instrument for within and across-state integration. I first use OLS to estimate equations of the form:

$$y_{mst} = \alpha_m + \alpha_t + \alpha_s t + \beta_1 x_{mst} + \beta_2 i_{mst} + \beta_3 x_{mst} \cdot i_{mst} + \beta_4 \mathbf{z}_{mst} + \epsilon_{mst} \quad (3)$$

I regress measures of firm growth (y_{mst}) on the growth rate of bank deposits (x_{mst}), a measure of financial integration (i_{mst}), the interaction between deposit growth and financial integration ($x_{mst} \cdot i_{mst}$), and a vector of market and state level covariates ($\mathbf{z}_{mst}$). I then re-estimate the effect of integration on growth using IV. I use an indicator variable and a linear time trend for post-deregulation years to instrument for financial integration and the interaction between deposit growth and financial integration. My model predicts that $\beta_3 < 0$. As the level of financial integration increases, the growth rate of local credit supply should have a smaller effect on firm growth. To the extent that the OLS regressions contain omitted variables that are positively correlated with deposit growth and financial integration and have a positive impact on firm growth, the OLS estimates of β_3 should be biased upward. Since the intra and inter-state branching deregulations are correlated with one another in time, I expect the IV regressions to do a poorer job in distinguishing the effect of one from the other compared to the difference-in-differences regressions, where the effects are jointly estimated.

When the dependent variable is the growth rate of establishments, the IV results are largely consistent with the prediction that an increase in financial integration lowers the dependence of smaller, potentially credit-constrained firms on local credit supply. Table 13 reports the OLS and IV results for MSA and non-MSA markets using the Market/State measure of within-state financial integration. The first stages for the IV regressions are reported in Column 2 of Table 6 and Column 5 of Table 7. The IV regressions provide evidence that, for establishments with 20-99 employees in MSA markets, the increase in financial integration due to intra-state deregulation lowers the dependence of growth on local credit supply. To interpret this coefficient, I consider the effect of an increase in within-state integration of .5, which constitutes the difference between an MSA market in 1992 at the 25th percentile of the integration distribution and one at the 75th percentile.

This change in integration is associated with a decrease in the marginal effect of deposit growth on firm growth of about .13. This estimate is quite consistent with the effect of .097 found in the differences-in-differences framework. As predicted, the OLS estimates for the interaction between deposit growth and integration are smaller in absolute value than the IV estimates. The IV regressions also show that within-state financial integration lowers the dependence of firm growth on credit supply in non-MSA markets for firms with 20-99 employees. It is possible that these regressions are picking up the effect of inter-state deregulation identified in the difference-in-differences framework.

The results for the effects of across-state integration on firm growth also suggest that integration lowers the reliance of small firms on local credit supply. Table 14 reports the OLS and IV results for MSA and non-MSA markets using the State/U.S. measure of across-state financial integration. For the IV regressions, the interaction between deposit growth and integration is statistically significant with the predicted sign for establishments with 1 to 19 employees and 20 to 99 employees in MSA markets, and for establishments with 20 to 99 employees in non-MSA markets. For establishments of 20 to 99 employees in non-MSA markets, I again consider the effect of an increase in across-state integration of .5, which is approximately the difference between a non-MSA market at the 25th percentile of the integration distribution and one at the 75th percentile in 1992. This change in integration is associated with a decrease in the marginal effect of deposit growth on firm growth of about .15. This estimate is consistent with the effect of .11 found for this establishment size in non-MSA markets in the difference-in-differences framework.

The IV results for across-state integration in MSA markets are not consistent with the difference-in-difference results, where no effects were found for inter-state deregulation. It is possible that the effect found for establishments with 20 to 99 employees in MSA markets for the IV regressions is due to the correlation in time between inter-state and intra-state deregulations. However, it is also possible that the IV specification captures the direct effect of integration on the relationship between credit supply and firm growth. This effect is estimated by proxy using deregulation indicators in the differences framework. The IV results imply that across-state financial integration reduces the reliance on local credit supply for firms with 1 to 19 employees and 20 to 99 employees in MSA markets.

The OLS and IV estimates using the growth rate of employment and payroll as dependent variables are also consistent with the model's predictions for the effects of financial integration on the sensitivity of firm growth to local credit supply. Table 15 reports the OLS and IV results for the effects of within-state integration. The IV estimates for the interaction between the Market/State integration measure and the growth rate of deposits are negative and statistically significant for both MSA and non-MSA markets. Table 16 reports the OLS and IV results for the effects of across-state integration. The IV estimates

for the interaction between the State/U.S. integration measure and the growth rate of deposits are also negative and statistically significant for both MSA and non-MSA markets. For both within and across-state integration, the IV estimates are, as predicted, larger in absolute value than the OLS estimates. For both within and across-state integration, however, the results for non-MSA markets are not consistent with the difference-in-difference estimates, which show no effect for intra or inter-state deregulation. As stated above, it is likely that the IV regressions are unable to distinguish the effect of intra and inter-state deregulation. It is also possible, however, that the IV regressions directly measure the effect of integration on the sensitivity of firm growth to credit supply. Under this interpretation, within-state and across-state financial integration reduce the sensitivity of firm growth—as measured by establishment growth and payroll growth—to local credit supply in both MSA and non-MSA markets.

VII Conclusion

This paper uses the timing of intra and inter-state bank branch deregulation to estimate the effect financial integration on the sensitivity of firm growth to local credit supply. Using a differences in differences framework, I find that intra-state deregulation lowers the sensitivity of growth to local credit supply in MSA markets for mid-sized establishments (20-99 employees). Inter-state deregulation has similar effects for mid-sized establishments in non-MSA markets. When employment growth and payroll growth are used as measures of firm growth, the effects of intra-state deregulation in MSA markets are consistent with those found for establishment growth. These measures provide no evidence, however, for an effect of inter-state deregulation in non-MSA markets.

I also use intra-state and inter-state deregulation to instrument for measures of within-state and across-state financial integration and estimate the effect on firm growth of the interaction between credit supply growth and integration. I find that within-state and across-state integration lower the dependence of growth on local credit supply for mid-sized establishments in both MSA and non-MSA markets. In light of this inconsistency between the difference-in-difference and IV estimates, I conclude that the IV regressions are unable to distinguish the effects of within and across-state integration.

What are the implications of these findings? Do they generalize to other institutional settings? What are their limitations? Empirical research based on observational data inevitably raises questions of external validity. I address these issues in weighing the possible policy consequences of my findings. In the area of bank regulation, my results suggest that countries should be wary of extensive restrictions on entry and expansion in the commercial banking market. This is an issue of special salience for small countries in which even a dense network of domestic banks may not sufficiently insure firms against local

credit shocks. For such countries, entry by foreign banks, though opposed by domestic banks and some incumbent firms, could be especially valuable to domestic firms.

Allowing foreign banks to enter can involve considerable regulatory challenges. This is especially true when there is a mismatch between the operational sophistication of foreign banks and domestic regulatory authorities. There are, however, creative ways a country can overcome these obstacles. Countries could insist that foreign commercial banks self-insure against losses to depositors. They could also curtail the ability of limited liability to protect foreign banks by insisting that a parent banking company be held liable for claims by depositors against a legally distinct subsidiary. Countries without well-developed banking laws can stipulate that the banking law of another jurisdiction, where the foreign bank has contacts, applies. While this practice is controversial, it need not involve a situation, for example, where the Kingdom of Bhutan declares that American or UK law applies. Bhutan could stipulate that Indian law applies, and utilize its pool of Indian-trained lawyers as well as the nearby market of Indian lawyers, to administer and interpret this law. This would also enable to Bhutan to proceed cautiously, by importing a set of laws that are still fairly restrictive in their concessions to foreign banks.

Policy implications also follow from my conclusion that there are diminishing marginal gains to integration through bank branching. Conditional on intra-state branching, inter-state branching had no effect on the sensitivity of firm growth to local credit supply in MSA markets. This suggests that countries wary of the potential risks of foreign bank entry can adopt selective or region-based entry policies and still capture much of the gains from integration. The limited effect of inter-state deregulation may, however, be a result of the comparative development of U.S. credit markets, where the effect of distortions in one market can be offset by the relative completeness of other markets. If so, then the potential gains from more extensive integration for countries with less developed credit markets are larger.

Simply ending formal restrictions on entry and expansion is, of course, no guarantee of entry and expansion. Cross-border bank expansion into a country or market tends to be driven by its growth potential, institutional quality, and the creditworthiness of its firms [Claessens 2006]. Predictably, good financial systems are characterized by more cross-border activity. These condition, while necessary, are perhaps not sufficient. The European liberalization of entry restriction has not resulted in significant cross-border banking activity. One reason for this is that retail banking and lending to small to medium sized firms relies on “soft information” that can be difficult for new entrants or foreign firms to acquire [Stein 2002]. Countries looking to capture the benefits of financial integration in their banking markets must also consider other, informal barriers to entry and design policies to lower these barriers while minimizing potential risks.

The benefits of commercial bank expansion that I identify can also inform contemporary discussions of how to regulate financial institutions that are potentially too big to fail. These benefits followed from the consolidation of the U.S. financial services industry over the last three decades. They suggest, first, that regulators should appreciate the distinction between the size and scope of financial institutions and the different consequences of restricting their growth. Whatever the merits of “universal banking,” there are significant advantages that accrue to customers and borrowers of large commercial banks. Second, they suggest that policy-makers should appreciate the benefits that redound to borrowers (firms) when banks can insure themselves against local market risks. I show the importance of this in the context of shocks to local credit supply, but the observation can be generalized. The ability of loan originators to insure themselves against the correlated risks of borrower failure helps borrowers. As we have seen in the case of mortgages, when insurers can purchase such insurance, the resulting potential for moral hazard is significant. Policy-makers should understand, however, that this is an economic trade-off, for which a “corner solution”—preventing banks from insuring against this risk by selling loans—is rarely optimal. Instead, regulations should be designed so that banks still have incentives to scrutinize borrowers and monitor repayments. This can be done by ensuring that the marginal dollar repaid to a pooled investment of loans still accrues to the originating bank.

My empirical findings have several implications for the scholarly literature on the effects of financial market structure on firm growth. First, my results suggest that within-state financial flows are crucial for reducing the sensitivity of firm growth to local credit shocks in larger, urban markets. Conditional on the availability of such flows, across-state financial integration has little impact. Across-state financial flows play a substantial role, however, in reducing the sensitivity of firm growth to local credit shocks in smaller, rural markets. Multi-state banks appear to be more willing or able to channel funds to rural markets in response such shocks. Given that within-state flows are associated with multi-market banks and across-state flows with multi-state BHCs, these findings suggest future work on the relationship between the internal capital markets of financial firms and their legal/institutional structure.

Second, the effects of financial integration on mid-sized firms that I find are consistent with those of Cetorelli and Strahan [2006], who show that after deregulation, sectors that are more dependent on external finance experience an increase in the fraction of mid-sized firms relative to sectors that are less dependent. This similarity suggests the need of further empirical work using bank-branch deregulation to investigate the sector-specific effects of firm credit constraints at the market level.

Third, my findings on the relative effects of within and across-state integration call into question Morgan, Rime, and Strahan’s [2004] evidence on the role of inter-state branch

deregulation in lowering state business cycle volatility. Their finding rely on IV regressions that use inter-state deregulation to instrument for measures of across-state integration. As my results show, such regressions do a poor job in distinguishing the effects of within and across-state integration. It is likely that their analysis overstates the role of across-state integration at the expense of within-state integration. This distinction is crucial for research on the implications of financial market structure in small, transition or developing countries, who must weigh the opportunity costs of efforts to increase international or domestic integration.

Fourth, my findings that firms respond on the labor margin to local credit shocks are consistent with studies that document large, across-state labor flows in response to state-specific macroeconomic shocks [Blanchard and Katz 1992]. This consistency suggests the need for further empirical work on the role of across-market and across-sector labor flows in response to market-specific credit shocks.

VIII References

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

Barth, James R., Gerard Caprio, and Ross Levine, *Rethinking Bank Regulation: Till Angels Govern*, Cambridge University Press (2006).

Berger, A.N., R.S. Demsetz, and P.E. Strahan, “The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future,” *Journal of Banking and Finance* 23 (1999), 135–194.

Berger, A.N., A.K. Kashyap, and J.M. Scalise, “The Transformation of the U.S. Banking Industry: What a Long, Strange Trip It’s Been,” *Brookings Papers on Economic Activity* 2 (1995), 55–218.

Bertrand, Marianne, Esther Duflo and Sendhil Mullainathan, “How Much Should We Trust Difference-in-Differences Estimators?” *Quarterly Journal of Economics*, CXIX (2004), 249–276.

Black, S.E., and P.E. Strahan, “Entrepreneurship and Bank Credit Availability,” *Journal of Finance* 57 (2002), 2807–2833.

Blanchard, Olivier, and Lawrence F. Katz, “Regional Evolutions,” *Brookings Papers on Economic Activity*, No. 1 (1992), 1–74.

Butler, Henry N., and Jonathan R. Macey, “The Myth of Competition in the Dual Banking System,” 73 *Cornell L. Rev.* 677, 693–701 (1988).

Calomiris, Charles, *U.S. Banking Deregulation in Historical Perspective*, Cambridge University Press (2000).

Calomiris, Charles, and Carlos Ramirez, “The Political Economy of Bank Entry Restrictions: Theory and Evidence from the U.S. in the 1920s,” *Columbia University Working Paper* (2004).

Cetorelli, N., and P.E. Strahan, “Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets,” *Journal of Finance* 61 (2006), 437-461.

Chapman, John M., and Ray B. Westerfield, *Branch Banking: Its Historical and Theoretical Position in American and Abroad*, Harper & Brothers (1942).

Claessens Stijn, “Competitive Implications of Cross-Border Banking,” in *Cross-Border Banking: Regulatory Challenges*, Gerard Caprio, Douglas D. Evanoff, and George G. Kaufman, eds., 151-82, World Scientific Publishing (2006).

Dehejia, Rajeev and Adriana Lleras-Muney, “Financial Development and Pathways of Growth: State Branching and Deposit Insurance Laws in the United States from 1900 to 1940,” *Journal of Law and Economics*, Vol. 50 (2007), No. 2, 239-272.

Diamond, Douglas W., “Financial Intermediation and Delegated Monitoring,” *The Review of Economic Studies*, Vol. 51, No. 3. (1984), 393-414.

Djankov, Simeon, Rafael La Porta, Florencio López de Silanes and Andrei Shleifer, “The Regulation of Entry” *Quarterly Journal of Economics*, 117 (2002), 1-37.

Djankov, Simeon, Rafael La Porta, Florencio López de Silanes and Andrei Shleifer, “Courts,” *Quarterly Journal of Economics*, 118 (2003), 453-517.

Djankov, Simeon, Caralee McLiesh and Andrei Shleifer, “Private Credit in 129 Countries,” *Journal of Financial Economics*, 84(2) (2007), 299-329.

Djankov, Simeon, Oliver Hart, Caralee McLiesh and Andrei Shleifer, “Debt Enforcement around the World,” *Journal of Political Economy*, 116(6) (2008), 1105-1149.

Gadinis, Stavros, “The Politics of Competition in International Financial Regulation”, 49 *Harv. Int’l L. J.* 447 (2008)

Goldsmith, Raymond, *Financial Structure and Development*, Yale University Press (1969)

Haselmann, Rainer F. H., Katharina Pistor, and Vikrant Vig, “How Law Affects Lending,” *Columbia Law and Economics Working Paper*, No. 285 (August 2008).

Holmstrom, Bengt, and Jean Tirole, “Financial Intermediation, Loanable Funds, and the Real Sector,” *Quarterly Journal of Economics*, CXII (1997), 663-691.

Houston, J.F., C.M. James, and D. Marcus, “Capital Market Frictions and the Role of Internal Capital Markets in Banking,” *Journal of Financial Economics* 46 (1997), 135-164.

Hubbard, R. Glenn, Darius Palia, and Nicolas Economides, “The Political Economy of Branching Restrictions and Deposit Insurance,” *Journal of Law and Economics*, XXIX (1996), 667-704.

Jackson, Howell E. “Centralization, Competition, and Privatization in Financial Regu-

lation,” *Theoretical Inquiries in Law*, Vol. 2(4) (2001).

Jayarathne, Jith and Philip E. Strahan, “The Finance-Growth Nexus: Evidence From Bank Branch Deregulation,” *Quarterly Journal of Economics* 111 (1996), 639–670.

Jayarathne, Jith and Philip E. Strahan, “Entry Restrictions, Industry Evolution and Dynamic Efficiency: Evidence from Commercial Banking,” *Journal of Law and Economics*, 41:1 (1998), 239-74.

King, Robert G., and Ross Levine, “Finance and Growth: Schumpeter Might Be Right,” *Quarterly Journal of Economics* 108 (1993), 717-737.

Kroszner, Randall S., and Philip E. Strahan, “What Drives Deregulation: Economics and Politics of the Relaxation of Bank Branching Restrictions,” *Quarterly Journal of Economics*, CXIV (1999), 1437–1467.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny, “Investor Protection and Corporate Governance,” *Journal of Financial Economics*, 58 (2000), 3-27.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny, “Law and Finance,” *Journal of Political Economy*, 106(6) (1998), 1113-55.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny, “The Legal Determinants of External Finance” *Journal of Finance*, 53(3), 1997, 1131-50.

Macey, Jonathan and Miller, Geoffrey, *Banking Law and Regulation*, Little, Brown and Company (1992).

Macey, Jonathan, Commercial Banking and Democracy: The Illusive Quest for Deregulation, *Yale Journal On Regulation*, Vol. 23, No. 1 (2006).

Malmendier, Ulrike, “Law and Finance at the Origin,” *Journal of Economic Literature* (forthcoming 2009).

Morgan, Donald P., Bertrand Rime and Philip E. Strahan, 2004, “Bank Integration and State Business Cycles,” *Quarterly Journal of Economics* 119(4), 1555-85.

Petersen, M., and R.G. Rajan, “Does Distance Still Matter? The Revolution in Small Business Lending” *Journal of Finance* 57 (2002), 2533–2570.

Rajan, Raghuram and Luigi Zingales, “Financial Dependence and Growth,” *American Economic Review* 88 (1998), 559-586.

Rajan, Raghuram and Luigi Zingales, “Financial Systems, Industrial Structure, and Growth” *Oxford Review of Economic Policy*, 17(4) (2002), 467-81.

Robinson, Joan, *The Rate of Interest and Other Essays*, Macmillan (1952).

Schumpeter, Joseph, *The Theory of Economic Development*, Oxford University Press (1969).

Stein, Jeremy, “Information Production and Capital Allocation: Decentralized Versus Hierarchical Firms,” *Journal of Finance* 57 (2002), 1891-1921.

IX Appendix

IX.1 Proofs of Propositions in Model

Proposition 1 *An increase/decrease in the local supply of capital lowers/raises the equilibrium price of bank finance and increases/decreases the equilibrium quantity of bank capital.*

Proof. The equilibrium condition in the market for bank credit ($D_b(r_d, r_b) = K_b$) implicitly determines the equilibrium pricing function $r_b(K_b, r_d)$. Applying the implicit function theorem and differentiating I obtain:

$$\begin{aligned} \frac{\partial r_b(K_b, r_d)}{\partial K_b} &= \left\{ \frac{\partial D_b(r_d, r_b(K_b, r_d))}{\partial r_b} \right\}^{-1} = \\ & \{ [F(A(r_d)) - F(A(r_d, r_b(K_b, r_d)))] \cdot \frac{dI_b(r_b(K_b, r_d))}{dr_b} - \\ & I_b(r_b(K_b, r_d)) \cdot F(A(r_d, r_b(K_b, r_d))) \cdot \frac{\partial A(r_d, r_b(K_b, r_d))}{\partial r_b} \}^{-1} = \\ & \{ (+)(-) - (+)(+)(+) \}^{-1} = (-) \end{aligned}$$

The result for quantities follows from the fact that $\frac{\partial D_b(r_d, r_b(K_b, r_d))}{\partial r_b} < 0$. ■

Proposition 2 *An increase/decrease in the demand for bank capital raises/lowers the equilibrium price of bank finance but leaves the equilibrium quantity of capital supplied/demanded unchanged.*

Proof. The result for quantities follows from the assumption of inelastic supply. To see the result for prices, I parametrize the distribution of assets across firms ($\sigma \cdot F(A)$) so that demand for monitoring capital is given by:

$$D_b(r_d, r_b, \sigma) = \sigma \cdot [F(A(r_d)) - F(A(r_d, r_b))] \cdot I_b(r_b)$$

Equilibrium is then given by

$$D_b(r_d, r_b(r_d, \sigma, K_b), \sigma) = K_b \Rightarrow$$

$$\frac{\partial r_b(r_d, \sigma, K_b)}{\partial \sigma} = - \frac{\left(\frac{\partial D_b(r_d, r_b(r_d, \sigma, K_b), \sigma)}{\partial \sigma} \right)}{\left(\frac{\partial D_b(r_d, r_b(r_d, \sigma, K_b), \sigma)}{\partial r_b} \right)} = \frac{(-) \cdot (+)}{(-)} = (+) \quad \blacksquare$$

In the single market case, the demand for bank capital and unmonitored debt capital are given by:

$$D_b(r_d, r_b) = [F(A(r_d)) - F(A(r_d, r_b))] \cdot I_b(r_b)$$

$$D_d(r_d, r_b) = \int_{A(r_d, r_b)}^{A(r_d)} [I - A - I_b(r_b)] f(A) dA + \int_{A(r_d)}^I [I - A] f(A) dA.$$

It is straightforward to show that for a fixed r_d , the demand for bank finance is strictly decreasing in r_b . An increase in r_d , on the other hand, has an ambiguous effect on the demand for bank finance. The sign of this effect depends on the relative mass of the number of the marginal firm who can just obtain outside finance ($f(A(r_d))$) and the marginal firm who can just obtain bank finance ($f(A(r_d, r_b))$), as well as the shift in the asset size of the marginal firms ($A'(r_d)$ and $\frac{\partial A(r_d, r_b)}{\partial r_d}$).

It is easy to see by inspection that the demand for unmonitored debt finance is strictly decreasing in r_d . The effect of an increase in the price of bank finance (r_b) on the demand for unmonitored debt capital is ambiguous because, while the set of firms who can access capital grows smaller ($\frac{\partial A(r_d, r_b(K_b, r_d))}{\partial r_b} > 0$), the amount of unmonitored debt capital for firms who do receive finance increases ($I'(r_b) < 0$). This implies that the effect of an increase in the local supply of bank capital (K_b) on the demand for unmonitored capital is ambiguous. Despite this ambiguity for the effect on unmonitored, or external, capital, the total market demand for capital is decreasing in the price of bank finance (r_b). The subsequent Propositions deal with case of integrated markets.

Proposition 3 *In an integrated market an increase/decrease in the local supply of capital lowers/raises the equilibrium price of bank finance and increases/decreases the demand for bank capital, but the price and quantity effects are smaller than in an unintegrated market.*

Proof. The above system implicitly determines the equilibrium pricing and allocation functions $r_b(r_d, K_1 + K_2)$ and $\theta(r_d, K_1 + K_2)$. Consider the market clearing condition in market one, parametrized by a market specific shock to capital ϵ that is initially set to zero:

$$D_{b1}(r_d, r_b(r_d, K_1 + K_2, \epsilon)) = \theta(r_d, K_1 + K_2, \epsilon) \cdot (K_1 + K_2) + \epsilon \Rightarrow \quad (1)$$

$$\frac{\partial D_{b1}(r_d, r_b(r_d, K_1 + K_2, \epsilon))}{\partial r_b} \cdot \frac{\partial r_b(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} =$$

$$1 + \frac{\partial \theta(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} \cdot (K_1 + K_2) \Rightarrow \quad (2)$$

$$\frac{\partial r_b(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} = [1 + \frac{\partial \theta(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} \cdot (K_1 + K_2)] \cdot \left\{ \frac{\partial D_{b1}(r_d, r_b(r_d, K_1 + K_2, \epsilon))}{\partial r_b} \right\}^{-1} \quad (3)$$

This expression is identical to that in Proposition 1 except for the first term in the square brackets. Totally differentiating the equilibrium condition for the second market, I get:

$$\frac{\partial D_{b2}(r_d, r_b(r_d, K_1 + K_2, \epsilon))}{\partial r_b} \cdot \frac{\partial r_b(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} = -\frac{\partial \theta(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} \cdot (K_1 + K_2) \quad (4)$$

Imposing the symmetry condition, equations (2) and (3) imply

$$\begin{aligned} \frac{\partial \theta(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} &= -\frac{1}{2} \cdot ((K_1 + K_2)^{-1} \Rightarrow \text{(using (3))}) \\ \frac{\partial r_b(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} &= \frac{1}{2} \cdot \left\{ \frac{\partial D_b(r_d, r_b(r_d, K_1 + K_2, \epsilon))}{\partial r_b} \right\}^{-1} = (-) \end{aligned}$$

Therefore the price response to a shock to capital is negative but half that of an unintegrated market. ■

Proposition 4 *In an integrated market, an increase/decrease in the demand for bank capital raises/lowers the equilibrium price of bank finance, but the price effects are smaller than for an unintegrated market.*

Proof. Parametrize the distribution of assets across firms ($\sigma \cdot F(A)$) so that the equilibrium condition for monitoring capital in market one is given by:

$$\begin{aligned} D_{b1}(r_d, r_b(r_d, K_1 + K_2, \sigma), \sigma) &= \theta(r_d, K_1 + K_2, \sigma) \cdot (K_1 + K_2) \Rightarrow (1) \\ \frac{\partial D_{b1}(r_d, r_b(r_d, K_1 + K_2, \sigma), \sigma)}{\partial r_b} \cdot \frac{\partial r_b(r_d, K_1 + K_2, \sigma)}{\partial \sigma} &+ \frac{\partial D_{b1}(r_d, r_b(r_d, K_1 + K_2, \sigma), \sigma)}{\partial \sigma} = \\ \frac{\partial \theta(r_d, K_1 + K_2, \sigma)}{\partial \sigma} \cdot (K_1 + K_2) &\quad (2) \end{aligned}$$

Differentiating the equilibrium expression for the second market I get

$$\frac{\partial D_{b2}(r_d, r_b(r_d, K_1 + K_2, \sigma), \sigma)}{\partial r_b} \frac{\partial r_b(r_d, K_1 + K_2, \sigma)}{\partial \sigma} = -\frac{\partial \theta(r_d, K_1 + K_2, \sigma)}{\partial \sigma} \cdot (K_1 + K_2) \quad (3)$$

Combining (2) and (3) and imposing the symmetry conditions implies

$$\frac{\partial r_b(r_d, K_1 + K_2, \sigma)}{\partial \sigma} = -\frac{1}{2} \cdot \left(\frac{\frac{\partial D_b(r_d, r_b(r_d, \sigma, K_b), \sigma)}{\partial \sigma}}{\left(\frac{\partial D_b(r_d, r_b(r_d, \sigma, K_b), \sigma)}{\partial r_b} \right)} \right) = (+) \quad \blacksquare$$

Proposition 5 *In an integrated market, an increase/decrease in the demand for bank capital increases/decreases the equilibrium quantity of bank capital, but the quantity effects are larger than for an unintegrated market.*

Proof. From (2) and (3) above it follows that

$$\frac{\partial \theta(r_d, K_1 + K_2, \sigma)}{\partial \sigma} = \frac{1}{2} \left(\frac{\partial D_b(r_d, r_b(r_d, \sigma, K_b), \sigma)}{\partial \sigma} \right) \cdot (K_1 + K_2)^{-1} = (+)$$

This effect is larger than for an unintegrated market, where a shift in demand has no effect on the equilibrium quantity. ■

IX.2 Tables

Table 1

Deregulation of Bank Branching by State

State	Year of Deregulation		State	Year of Deregulation	
	Inter State	Intra State		Inter State	Intra State
Maine	1978	1975	Pennsylvania	1986	1982
Alaska	1982	<1970	South Carolina	1986	<1970
New York	1982	1976	Alabama	1987	1981
Connecticut	1983	1980*	California	1987	<1970
Massachusetts	1983	1984	Louisiana	1987	1988
Kentucky	1984	1990	New Hampshire	1987	1987
Rhode Island	1984	<1970	Oklahoma	1987	1988*
Utah	1984	1981	Texas	1987	1988*
Washington, DC	1985	<1970	Washington	1987	1985
Florida	1985	1988*	Wisconsin	1987	1990*
Georgia	1985	1983	Wyoming	1987	1988*
Idaho	1985	<1970	Colorado	1988	1991*
Maryland	1985	<1970	Delaware	1988	<1970
Nevada	1985	<1970	Mississippi	1988	1986
North Carolina	1985	<1970	South Dakota	1988	<1970
Ohio	1985	1979	Vermont	1988	1970
Tennessee	1985	1985	West Virginia	1988	1987*
Virginia	1985	1978	Arkansas	1989	1994*
Arizona	1986	<1970	New Mexico	1989	1991*
Illinois	1986	1988*	Nebraska	1990	1985*
Indiana	1986	1989	Iowa	1991	2001
Michigan	1986	1987	North Dakota	1991	1987*
Minnesota	1986	1993*	Kansas	1992	1987*
Missouri	1986	1990*	Montana	1993	1990*
New Jersey	1986	1977	Hawaii	1994	1986*
Oregon	1986	1985			

* Indicates unit branching state

Table 2
Banking Market Characteristics

		Average Market Characteristics				
		Pop	3-Firm	Herf	Banks	Markets
MSA						
1977	466,967	0.69 (0.17)	0.22 (0.11)	18.9 (28.2)	362	
1982	493,581	0.67 (0.16)	0.21 (0.10)	18.9 (27.6)	362	
1987	493,581	0.69 (0.15)	0.22 (0.10)	18.9 (25.5)	362	
1992	556,030	0.70 (0.15)	0.22 (0.10)	18.0 (21.8)	362	
1997	592,037	0.69 (0.13)	0.21 (0.10)	17.0 (18.0)	363	
Non-MSA						
1977	20,720	0.90 (0.14)	0.45 (0.25)	4.0 (2.9)	2,256	
1982	21,529	0.90 (0.14)	0.44 (0.24)	4.1 (2.8)	2,265	
1987	24,189	0.90 (0.14)	0.44 (0.24)	4.0 (2.8)	2,272	
1992	22,311	0.90 (0.13)	0.43 (0.23)	4.1 (2.7)	2,262	
1997	23,565	0.89 (0.13)	0.42 (0.23)	4.3 (2.67)	2,262	

Notes: Each column represents the market average for a given year with standard deviations in parentheses. "3 firm" is the fraction of deposits in a market held by the largest three banks or bank holding companies. "Herf" is the market Herfindahl index for deposits computed at the bank holding company level. "Banks" is the number of banks and bank holding companies.

Table 3
Banking Market Characteristics

		Average Financial Integration					
		Bank			BHC		
		Mkt/St	Multi	St/US	Mkt/St	Multi	St/US
MSA							
	1977	0.32 (0.40)	0.33 (0.39)	0.00 (0.02)	0.61 (0.38)	0.54 (0.35)	0.10 (0.25)
	1982	0.41 (0.41)	0.38 (0.40)	0.00 (0.01)	0.66 (0.37)	0.61 (0.35)	0.12 (0.26)
	1987	0.50 (0.41)	0.48 (0.38)	0.00 (0.01)	0.78 (0.26)	0.74 (0.25)	0.34 (0.31)
	1992	0.66 (0.34)	0.62 (0.31)	0.00 (0.04)	0.81 (0.22)	0.78 (0.21)	0.55 (0.30)
	1997	0.79 (0.24)	0.77 (0.22)	0.41 (0.34)	0.83 (0.21)	0.83 (0.18)	0.56 (0.28)
Non-MSA							
	1977	0.23 (0.38)	0.21 (0.36)	0.00 (0.00)	0.36 (0.44)	0.28 (0.38)	0.06 (0.21)
	1982	0.26 (0.40)	0.24 (0.38)	0.00 (0.00)	0.43 (0.45)	0.34 (0.39)	0.07 (0.22)
	1987	0.34 (0.42)	0.31 (0.39)	0.00 (0.01)	0.57 (0.42)	0.48 (0.39)	0.14 (0.27)
	1992	0.51 (0.40)	0.44 (0.38)	0.00 (0.01)	0.67 (0.37)	0.59 (0.36)	0.26 (0.35)
	1997	0.68 (0.35)	0.60 (0.36)	0.19 (0.33)	0.77 (0.30)	0.70 (0.32)	0.35 (0.36)

Notes: Each column represents the market average for a given year with standard deviations in parentheses. "Mkt/St" is one minus the total deposits in the market divided by the total deposits held by market banks or bank holding companies in the state. "Multi" is the fraction of deposits in the market held by multi-market banks or bank holding companies. "St/US" is one minus the total deposits held by market banks or bank holding companies in the state divided by their total deposits in the United States.

Table 4
State Banking Market Characteristics

	Bank Market/State			BHC Market/State		
	CA	CO	IL	CA	CO	IL
MSA						
1977	0.96 (0.08)	0.00 (0.00)	0.00 (0.00)	0.96 (0.08)	0.81 (0.24)	0.00 (0.00)
1982	0.96 (0.09)	0.00 (0.00)	0.00 (0.00)	0.96 (0.09)	0.84 (0.25)	0.08 (0.11)
1987	0.95 (0.09)	0.00 (0.00)	0.01 (0.02)	0.95 (0.08)	0.83 (0.25)	0.54 (0.24)
1992	0.95 (0.08)	0.42 (0.29)	0.14 (0.16)	0.95 (0.08)	0.82 (0.24)	0.67 (0.26)
1997	0.95 (0.08)	0.81 (0.24)	0.70 (0.28)	0.95 (0.08)	0.83 (0.23)	0.74 (0.27)
Non-MSA						
1977	1.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (0.00)	0.19 (0.37)	0.01 (0.04)
1982	1.00 (0.00)	0.02 (0.14)	0.01 (0.04)	1.00 (0.00)	0.29 (0.42)	0.07 (0.16)
1987	1.00 (0.00)	0.06 (0.21)	0.02 (0.07)	1.00 (0.00)	0.37 (0.43)	0.29 (0.30)
1992	1.00 (0.00)	0.18 (0.28)	0.22 (0.23)	1.00 (0.00)	0.43 (0.40)	0.47 (0.35)
1997	1.00 (0.00)	0.61 (0.37)	0.60 (0.29)	1.00 (0.00)	0.74 (0.31)	0.70 (0.26)

Notes: Each column represents the market average for a given year with standard deviations in parentheses. "Market/State" is one minus the total deposits in the market divided by the total deposits held by market banks or bank holding companies in the state.

Table 5
State Banking Market Characteristics

		Bank State/US			BHC State/US		
		CA	CO	IL	CA	CO	IL
MSA							
	1977	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.10 (0.03)	0.22 (0.37)	0.00 (0.00)
	1982	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.10 (0.02)	0.20 (0.35)	0.02 (0.07)
	1987	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.23 (0.02)	0.48 (0.36)	0.23 (0.31)
	1992	0.00 (0.00)	0.01 (0.02)	0.00 (0.00)	0.29 (0.03)	0.85 (0.03)	0.74 (0.13)
	1997	0.24 (0.04)	0.69 (0.13)	0.17 (0.27)	0.15 (0.06)	0.88 (0.01)	0.75 (0.14)
Non-MSA							
	1977	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.04 (0.07)	0.00 (0.00)	0.02 (0.13)
	1982	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.04 (0.06)	0.00 (0.00)	0.02 (0.11)
	1987	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.17 (0.08)	0.00 (0.00)	0.12 (0.28)
	1992	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.29 (0.07)	0.13 (0.29)	0.24 (0.33)
	1997	0.30 (0.06)	0.09 (0.25)	0.11 (0.29)	0.15 (0.08)	0.45 (0.39)	0.33 (0.39)

Notes: Each column represents the market average for a given year with standard deviations in parentheses. "State/US" is one minus the total deposits held by market banks or bank holding companies in the state divided by the total deposits of these bank or bank holding companies in the United States.

Table 6
Change in Market/State Deposit Ratio Post Intra-State Branching Deregulation

	Dependent Variable - Market/State Ratio					
	Treatment - Intra State Deregulation					
	Banks			BHCs		
	(1)	(2)	(3)	(4)	(5)	(6)
MSA						
Intra*Post	0.1892*** (0.0588)	0.1658*** (0.0562)	0.1823*** (0.0552)	0.0083 (0.0152)	0.0014 (0.0163)	0.0053 (0.0162)
Intra*Post*Time	0.0336* (0.0184)	0.0291 (0.0248)	0.026 (0.0235)	-0.0134** (0.0058)	-0.0172** (0.0078)	-0.0138* (0.0071)
R-sq	0.87	0.87	0.88	0.90	0.90	0.90
N	7,581	7,200	7,560	7,581	7,200	7,560
NonMSA						
Intra*Post	0.1227*** (0.0212)	0.0982*** (0.0170)	0.1050*** (0.0203)	0.0435** (0.0197)	0.0374* (0.0193)	0.0402** (0.0192)
Intra*Post*Time	0.0175*** (0.0051)	0.0427*** (0.0081)	0.0373*** (0.0076)	0.0172*** (0.0063)	0.0145* (0.0073)	0.0138* (0.0072)
R-sq	0.80	0.83	0.84	0.80	0.80	0.81
N	47,488	44,544	46,800	47,488	44,544	46,800
Covar	None	Growth	Level	None	Growth	Level

Notes: The table presents an OLS regression of the market/state deposit ratio on market indicators, year indicators, state time trends, indicators and linear trends for post-deregulation years, and state and market level covariates. The market/state deposit ratio represents one minus the total amount of deposits in a market divided by the total deposits held by banks or bank holding companies in that market anywhere in the state. The second and third column contain market and state level covariates in growth rates and levels, respectively. All regressions are clustered at the state level. Deposit level data are from the Federal Reserve's Summary of Deposits.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7
Change in State/U.S. Deposit Ratio Post Inter-State Branching Deregulation

	Dependent Variable - State/U.S. Ratio					
	Treatment - Inter State Deregulation					
	Banks			BHCs		
	(1)	(2)	(3)	(4)	(5)	(6)
MSA						
Inter*Post	-0.0151 (0.0093)	-0.0064 (0.0092)	-0.0034 (0.0095)	0.1428*** (0.0361)	0.1289*** (0.0363)	0.1192*** (0.0358)
Inter*Post*Time	-0.0128 (0.0091)	-0.0140 (0.0105)	-0.0096 (0.0085)	0.0794*** (0.0201)	0.0795*** (0.0213)	0.0771*** (0.0189)
R-sq	0.62	0.63	0.62	0.74	0.85	0.85
N	7,581	7,200	7,560	7,581	7,200	7,560
NonMSA						
Inter*Post	-0.0191*** (0.0063)	-0.0147** (0.0061)	-0.0151** (0.0066)	0.0666*** (0.0167)	0.0646*** (0.0156)	0.0585*** (0.0150)
Inter*Post*Time	-0.0136*** (0.0048)	-0.0153** (0.0059)	-0.0130** (0.0054)	0.0500*** (0.0105)	0.0508*** (0.0105)	0.0441*** (0.0089)
R-sq	0.35	0.35	0.35	0.37	0.70	0.71
N	47,488	44,544	46,800	47,488	44,544	46,800
Covar	None	Growth	Level	None	Growth	Level

Notes: The table presents an OLS regression of the State/U.S. deposit ratio on market indicators, year indicators, state time trends, indicators and linear time trends for post-deregulation years, and state and market level covariates. The State/U.S. deposit ratio represents one minus the total amount of deposits in the state held by banks or bank holding companies in that market, divided by the total deposits held in the United States by these entities. The second and third column contain market and state level covariates in growth rates and levels, respectively. All regressions are clustered at the state level. Deposit level data are from the Federal Reserve's Summary of Deposits.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8**Mean Establishment Size by Number of Employees**

		Number of Employees		
		1 to 19	20 to 99	100 plus
MSA				
1977		8145	993	210
		87%	10.6%	2.3%
1982		8671	1192	252
		85.8%	11.8%	2.5%
1987		11347	1469	303
		86.6%	11.2%	2.3%
1992		12087	1576	327
		86.5%	11.3%	2.3%
1997		13097	1781	392
		85.9%	11.7%	2.6%
Non MSA				
1977		367	30	6
		91.2%	7.4%	1.5%
1982		360	34	6
		89.8%	8.6%	1.6%
1987		442	39	7
		90.6%	7.9%	1.5%
1992		466	44	8
		90.0%	8.5%	1.6%
1997		507	50	10
		89.4%	8.9%	1.8%

Note: Each column represents the mean number and fraction of firms in a given size class for MSA and NonMSA Markets. Firm data are from the County Business Patterns.

Table 9
Growth Rate of Establishments Post Inter & Intra State Branching Deregulation

	Dependent Variable - Growth Rate of Establishments Across Employee Size					
	Treatment - Inter and Intra State Deregulation					
	State Time Trends			State/Year Indicators		
	1-19 Emp	20-99 Emp	100+ Emp	1-19 Emp	20-99 Emp	100+ Emp
	(1)	(2)	(3)	(4)	(5)	(6)
MSA						
Gr Bdeps	0.0327*** (0.0117)	0.0393* (0.0208)	0.0575 (0.0480)	0.0193** (0.0090)	0.0080 (0.0286)	0.0232 (0.0490)
Gr Bdeps*Intra	-0.0005 (0.0179)	0.0810*** (0.0302)	-0.0192 (0.0766)	0.0065 (0.0174)	0.1329*** (0.0449)	-0.0218 (0.0682)
Gr Bdeps*Intra*Post	-0.0076 (0.0183)	-0.0967*** (0.0307)	-0.0113 (0.0706)	-0.0048 (0.0182)	-0.1161** (0.0517)	0.0267 (0.0812)
Intra*Post	0.0031 (0.0020)	0.0085 (0.0054)	0.0068 (0.0057)			
Gr Bdeps*Inter*Post	-0.0059 (0.0108)	-0.0168 (0.0272)	-0.0472 (0.0369)	-0.0051 (0.0110)	-0.0149 (0.0391)	-0.0450 (0.0612)
Inter*Post	0.0023 (0.0018)	-0.0025 (0.0038)	0.0029 (0.0064)			
N	6,995	7,025	7,027	6,995	6,995	7,027
R-sq	0.81	0.34	0.21	0.87	0.49	0.34

Notes: The table presents an OLS regression of the growth rate of establishments by employment size in MSA markets on the growth rate of market deposits interacted with indicator variables for deregulating states and post-deregulation years. Coefficients for market level covariates --growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis. All regressions contain market level fixed effects and are clustered at the state level.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10

Growth Rate of Establishments Post Inter & Intra State Branching Deregulation

	Dependent Variable - Growth Rate of Establishments Across Employee Size					
	Treatment - Inter and Intra State Deregulation					
	State Time Trends			State/Year Indicators		
	1-19 Emp	20-99 Emp	100+ Emp	1-19 Emp	20-99 Emp	100+ Emp
	(1)	(2)	(3)	(4)	(5)	(6)
NonMSA						
Gr Bdeps	0.0349*** (0.0098)	0.1381*** (0.0493)	0.0436 (0.0484)	0.0328*** (0.0113)	0.1034** (0.0403)	0.0107 (0.0580)
Gr Bdeps*Intra	0.0168 (0.0138)	-0.0003 (0.0571)	0.0461 (0.0548)	0.0138 (0.0149)	0.0199 (0.0471)	0.0852 (0.0723)
Gr Bdeps*Intra*Post	-0.0120 (0.0139)	0.0043 (0.0471)	-0.0516 (0.0608)	-0.0096 (0.0149)	-0.0176 (0.0471)	-0.0666 (0.0807)
Intra*Post	0.0018 (0.0018)	0.0054 (0.0059)	0.0059 (0.0059)			
Gr Bdeps*Inter*Post	-0.0095 (0.0122)	-0.1090*** (0.0384)	-0.0533 (0.0589)	-0.0088 (0.0113)	-0.0814** (0.0373)	-0.0290 (0.0636)
Inter*Post	0.0024 (0.0016)	0.0105 (0.0064)	0.0005 (0.0057)			
N	41,091	41,045	40,902	41,091	41,045	40,902
R-sq	0.41	0.06	0.05	0.44	0.09	0.07

Notes: The table presents an OLS regression of the growth rate of establishments by employment size in nonMSA markets on the growth rate of market deposits interacted with indicator variables for deregulating states and post-deregulation years. Coefficients for market level covariates --growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis. All regressions contain market level fixed effects and are clustered at the state level.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 11

Growth Rate of Employment & Payroll Post Inter & Intra State Branching Deregulation

	Dependent Variable - Growth Rate of Employment and Payroll			
	Treatment - Inter and Intra State Deregulation			
	State Time Trends		State/Year Indicators	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)
MSA				
Gr Bdeps	0.0447*** (0.0132)	0.0071 (0.0196)	0.0326** (0.0132)	-0.0030 (0.0201)
Gr Bdeps*Intra	0.0561** (0.0235)	0.0989*** (0.0282)	0.0512** (0.0202)	0.0937*** (0.0315)
Gr Bdeps*Intra*Post	-0.0639** (0.0262)	-0.0515* (0.0283)	-0.0552** (0.0263)	-0.0444 (0.0366)
Intra*Post	0.0061 (0.0040)	0.0013 (0.0044)		
Gr Bdeps*Inter*Post	-0.0343** (0.0144)	-0.0388* (0.0201)	-0.0278 (0.0190)	-0.0276 (0.0245)
Inter*Post	-0.0005 (0.0030)	0.0000 (0.0031)		
N	7,021	7,017	7,021	7,017
R-sq	0.56	0.59	0.65	0.68

Notes: The table presents an OLS regression of the growth rate of establishments by employment size in MSA markets on the growth rate of market level deposits interacted with dummy variables for post-regulation years. Coefficients for market level covariates--growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 12

Growth Rate of Employment & Payroll Post Inter & Intra State Branching Deregulation

	Dependent Variable - Growth Rate of Employment and Payroll			
	Treatment - Inter and Intra State Deregulation			
	State Time Trends		State/Year Indicators	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)
NonMSA				
Gr Bdeps	0.0417** (0.0201)	0.0839*** (0.0234)	0.0314 (0.0204)	0.0732*** (0.0189)
Gr Bdeps*Intra	0.0260 (0.0248)	0.0369 (0.0299)	0.0131 (0.0247)	0.0148 (0.0267)
Gr Bdeps*Intra*Post	-0.0177 (0.0222)	-0.0367 (0.0275)	-0.0116 (0.0203)	-0.0355 (0.0288)
Intra*Post	0.0038 (0.0032)	0.0015 (0.0031)		
Gr Bdeps*Inter*Post	-0.0119 (0.0173)	-0.0377* (0.0194)	0.0014 (0.0164)	-0.0195 (0.0197)
Inter*Post	0.0007 (0.0032)	0.0063 (0.0038)		
N	41,073	41,070	41,073	41,070
R-sq	0.19	0.22	0.23	0.26

Notes: The table presents an OLS regression of the growth rate of establishments by employment size in NonMSA markets on the growth rate of market level deposits interacted with dummy variables for post-regulation years. Coefficients for market level covariates--growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 13
Change in Growth Rate of Establishments and Within-State Financial Integration

	Dependent Variable - Growth Rate of Establishments Across Employee Size					
	Market/State Integration Measure					
	OLS Regression			IV Regression		
	1-19 Emp (1)	20-99 Emp (2)	100+ Emp (3)	1-19 Emp (4)	20-99 Emp (5)	100+ Emp (6)
MSA						
Gr Bdeps	0.0341*** (0.0116)	0.0621* (0.0314)	0.0818** (0.0367)	0.0485 (0.0343)	0.2071*** (0.0797)	0.1135 (0.1471)
Integration	0.0054** (0.0025)	0.0014 (0.0069)	0.0000 (0.0073)	0.0123 (0.0096)	-0.0146 (0.0292)	0.0120 (0.0266)
Gr Bdeps*Integration	-0.0154 (0.0166)	-0.0423 (0.0381)	-0.1225** (0.0602)	-0.0384 (0.0527)	-0.2711** (0.1121)	-0.1728 (0.2161)
N	6,995	7,025	7,027	6,995	7,025	7,027
R-sq	0.81	0.34	0.21			
NonMSA						
Gr Bdeps	0.0524*** (0.0051)	0.0974*** (0.0221)	0.0320 (0.0326)	0.0628*** (0.0217)	0.2411*** (0.0909)	0.1317 (0.0966)
Integration	0.0022* (0.0012)	-0.0028 (0.0047)	0.0008 (0.0067)	-0.0043 (0.0139)	0.0355 (0.0303)	-0.0031 (0.0371)
GrBdeps*Integration	-0.0321*** (0.0086)	-0.0426 (0.0357)	-0.0136 (0.0584)	-0.0542 (0.0448)	-0.3573** (0.1654)	-0.2297 (0.1942)
N	41,091	41,045	40,902	41,089	41,044	40,899
R-sq	0.41	0.06	0.05			

Notes: The table presents OLS and IV regressions of the growth rate of establishments by employment size in MSA and nonMSA markets on the growth rate of market level deposits, the Market/State measure of within-state financial integration, the interaction of deposit growth and integration, and market and state level covariates. The IV regressions use an indicator variable and linear time trend for years after intra-state deregulation to instrument for the measure of within-state financial integration. Coefficients for market level covariates --growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 14
Change in Growth Rate of Establishments and Across-State Financial Integration

	Dependent Variable - Growth Rate of Establishments Across Employee Size					
	State/U.S. Integration Measure					
	OLS Regression			IV Regression		
	1-19 Emp (1)	20-99 Emp (2)	100+ Emp (3)	1-19 Emp (4)	20-99 Emp (5)	100+ Emp (6)
MSA						
Gr Bdeps	0.0345*** (0.0073)	0.0836*** (0.0256)	0.0362 (0.0363)	0.0486*** (0.0128)	0.1203*** (0.0332)	0.1012* (0.0613)
Integration	0.0021 (0.0024)	0.0031 (0.0058)	-0.0073 (0.0086)	0.0123 (0.0104)	-0.0321 (0.0308)	-0.0334 (0.0315)
Gr Bdeps*Integration	-0.0240 (0.0148)	-0.1136*** (0.0402)	-0.0740 (0.0587)	-0.0584** (0.0282)	-0.1952*** (0.0607)	-0.2231* (0.1183)
N	6,995	7,025	7,027	6,995	7,025	7,027
R-sq	0.81	0.34	0.21			
NonMSA						
Gr Bdeps	0.0480*** (0.0055)	0.0920*** (0.0193)	0.0203 (0.0271)	0.0501*** (0.0084)	0.1487*** (0.0300)	0.0862** (0.0398)
Integration	0.0022* (0.0011)	-0.0050 (0.0044)	-0.0085 (0.0070)	-0.0395* (0.0228)	-0.0811* (0.0489)	-0.0757 (0.0502)
GrBdeps*Integration	-0.0487*** (0.0109)	-0.0649 (0.0470)	0.0282 (0.0703)	-0.0476 (0.0357)	-0.3090*** (0.1183)	-0.2626* (0.1356)
N	41,091	41,045	40,902	41,089	41,044	40,899
R-sq	0.41	0.06	0.05			

Notes: The table presents OLS and IV regressions of the growth rate of establishments by employment size in MSA and nonMSA markets on the growth rate of market level deposits, the State/U.S. measure of across-state financial integration, the interaction of deposit growth and integration, and market and state level covariates. The IV regressions use an indicator variable and linear time trend for years after inter-state deregulation to instrument for the measure of across-state financial integration. Coefficients for market level covariates --growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 15

Change in Growth Rate of Employment/Payroll and Within-State Financial Integration

	Dependent Variables - Growth Rate of Employment and Payroll			
	Market/State Integration Measure			
	OLS Regression		IV Regression	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)
MSA				
Gr Bdeps	0.0959*** (0.0173)	0.1013*** (0.0206)	0.1618*** (0.0452)	0.1256*** (0.0403)
Integration	0.0055 (0.0057)	0.0080 (0.0064)	0.0002 (0.0179)	0.0026 (0.0213)
Gr Bdeps*Integration	-0.1076*** (0.0245)	-0.1196*** (0.0276)	-0.2115*** (0.0642)	-0.1579*** (0.0601)
N	7,021	7,017	7,021	7,017
R-sq	0.56	0.59		
NonMSA				
Gr Bdeps	0.0687*** (0.0105)	0.0951*** (0.0154)	0.0985*** (0.0244)	0.1651*** (0.0339)
Integration	0.0024 (0.0021)	0.0041 (0.0029)	0.0040 (0.0257)	0.0259 (0.0311)
GrBdeps*Integration	-0.0457*** (0.0151)	-0.0426** (0.0211)	-0.1108** (0.0473)	-0.1966*** (0.0578)
N	41,073	41,070	41,071	41,067
R-sq	0.19	0.22		

Notes: The table presents OLS and IV regressions of the growth rate of employment and payroll in MSA and nonMSA markets, respectively, on the growth rate of market level deposits, the Market/State measure of within-state financial integration, the interaction of deposit growth and integration, and market and state level covariates. The IV regressions use an indicator variable and linear time trend for years after intra-state deregulation to instrument for the measure of within-state financial integration. Coefficients for market level covariates --growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 16

Change in Growth Rate of Employment/Payroll and Across-State Financial Integration

	Dependent Variables - Growth Rate of Employment and Payroll			
	State/U.S. Integration Measure			
	OLS Regression		IV Regression	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)
MSA				
Gr Bdeps	0.0639*** (0.0159)	0.0725*** (0.0178)	0.1095*** (0.0243)	0.1037*** (0.0234)
Integration	0.0004 (0.0045)	0.0034 (0.0050)	-0.0307 (0.0190)	-0.0138 (0.0159)
Gr Bdeps*Integration	-0.0850*** (0.0300)	-0.1104*** (0.0291)	-0.1878*** (0.0502)	-0.1814*** (0.0510)
N	7,021	7,017	7,021	7,017
R-sq	0.56	0.59		
NonMSA				
Gr Bdeps	0.0592*** (0.0088)	0.0909*** (0.0108)	0.0776*** (0.0108)	0.1237*** (0.0158)
Integration	-0.0022 (0.0018)	-0.0001 (0.0030)	-0.0555* (0.0288)	-0.0437 (0.0377)
GrBdeps*Integration	-0.0528** (0.0207)	-0.0716*** (0.0189)	-0.1251*** (0.0405)	-0.2131*** (0.0481)
N	41,073	41,070	41,071	41,067
R-sq	0.19	0.22		

Notes: The table presents OLS and IV regressions of the growth rate of employment and payroll in MSA and nonMSA markets, respectively, on the growth rate of market level deposits, the State/U.S measure of across-state financial integration, the interaction of deposit growth and integration, and market and state level covariates. The IV regressions use an indicator variable and linear time trend for years after inter-state deregulation to instrument for the measure of across-state financial integration. Coefficients for market level covariates --growth rates of personal income and population, bank market Herfindahl, 3-firm bank concentration ratio--and state level covariates--unemployment rate, population growth rate, GDP growth rate--are not included. Deposit level data are from the Federal Reserve's Summary of Deposits, county business data are from the County Business Patterns, and market and state level covariates are from the Bureau of Economic Analysis.

* significant at 10%; ** significant at 5%; *** significant at 1%

IX.3 Figures

Figure 1a - Single Market Equilibrium

Supply and Demand of Bank and Debt Capital

Figure 1b - Single Market Equilibrium

Supply and Demand of Bank and Debt Capital

Figure 1c - Single Market Equilibrium

Supply and Demand of Bank and Debt Capital

Figure 2 - Integrated Equilibrium

Initial Equilibrium in Markets for Bank Capital

Figure 3 - Integrated Equilibrium

Effect of Supply Shift for Bank Capital

Figure 4 - Integrated Equilibrium

Effect of Supply Shift for Bank Capital

Figure 5 - Integrated Equilibrium

Effect of Demand Shift for Bank Capital

Figure 6 - Integrated Equilibrium

Effect of Demand Shift for Bank Capital

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

Figure 14

Figure 15

Figure 16

Figure 17

Figure 18