BANKING MARKET INTEGRATION AND FIRM GROWTH*

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Abstract

Using the history of bank-branching restrictions in the United States, I show that banking market integration lowers the sensitivity of firm growth to local credit supply. In urban markets, within-state deregulation results in an 80% decrease in the effect of local deposit growth on mid-sized establishment growth. Across-state deregulation has an effect of identical magnitude in rural markets. I find similar effects using employment growth and payroll growth as measures of firm growth. These findings suggest that local credit constraints play an important role in amplifying economic volatility.

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Understanding the relationship between banking market structure, bank lending, and firm growth is a central focus of the literature on financial institutions. This literature provides considerable evidence that greater geographic competition between banks is associated with increased growth (Jayaratne and Strahan (1996), Huang (2008)). Recent empirical work has also shown that the integration of banking markets is associated with declines in economic volatility. Morgan, Rime, and Strahan (2004) provide evidence that ending restrictions on bank branching in the United States lowered the amplitude of state business cycles. They suggest that capital flows within and across banks provided the mechanism through which integration lowered volatility. Acharya, Imbs, and Sturgess (2010) provide evidence that diversification in the state-wide portfolio of loans accounts for this decline in volatility. Understanding the causal mechanisms behind these findings remains a subject of ongoing research.

This paper provides evidence that bank capital flows and credit constraints play an important role in the link between banking market integration and variation in firm growth. If banking markets are not integrated and banks face adverse selection when seeking non-deposit funding, then the supply of bank credit to firms is constrained by locally available funds. In such markets, firm growth should exhibit greater sensitivity to variations in local deposit supply. This sensitivity should be greater for smaller firms and firms in sectors with a greater need for external finance. In integrated markets, by contrast, local deposit supply should have no effect on growth. Firm growth in a local market may, however, exhibit greater sensitivity to movements in deposit supply and credit demand in outside markets where local banks have the opportunity to lend. I illustrate these predictions using a simple, two-market equilibrium model of firms that can take on unmonitored debt and monitored bank loans (Holmstrom & Tirole (1997), Morgan, Rime, and Strahan (2004)).

I test these predictions by utilizing the history of banking deregulation in the United States as a natural experiment. I construct a unique, panel dataset to capture market-level variation in bank integration, deposit growth, and firm growth. The panel consists of MSA (Metropolitan Statistical Area) and non-MSA (county) markets from the 50 states, excluding Delaware, from 1977-1997.[1] I ask whether states that lifted restrictions on bank branching (1) lowered the dependence of firm growth on changes in local deposit supply and (2) increased the dependence of firm growth on deposit supply and demand in other markets. By exploiting the differential timing of state deregulation, I provide evidence for a causal link between bank integration and the effect of local credit supply on firm growth.

[1] Data on deposits at the branch level are from the Federal Reserve's Summary of Deposits. Data on business establishments – total number, employment, and payroll – are from the County Business Patterns. Economic and demographic data at the MSA and county level are from the Bureau of Economic Analysis.

I also use the history of litigation over state regulatory authority over banks to identify a subset of states that changed their branching laws for reasons that were unrelated to local economic conditions. I show that these changes took place as a result of political decisions by federal banking regulators and doctrinal developments in federal banking law. Using this subset of states as a "treatment group" helps to address the endogeneity concerns that arise when using legal changes to identify causal relationships.

I first provide evidence that within and across-state deregulation led to a sharp increase in banking market integration, defined as the effective deposits available to a market through within-bank transfers, relative to the size of that market. I show that within-state deregulation led to an increase in within-state bank integration and across-state deregulation led to an increase in across-state bank integration. I also identify the different institutional mechanisms through which this process occurred. Within-state integration took place at the level of the banking corporation. Across-state integration took place at the bank holding company (BHC) level.

After demonstrating this "first stage," I use a generalized difference-in-differences approach to estimate the change in the correlation between local credit supply growth and firm growth in deregulating states, relative to a control group of states.[2] I use local deposit growth to measure changes in the supply of credit and growth in the number of establishments to measure firm growth.[3] I find that for establishments with 20 to 99 employees, within-state deregulation lowered the association between deposit growth and establishment growth in MSA markets. In non-MSA markets, across-state deregulation had this effect. These results are qualitatively consistent with the predictions of the model. The marginal firm affected by credit constraints is neither so small that it cannot obtain arms-length finance nor so large that it can turn to the debt market. The estimates are similar in magnitude when employment growth and payroll growth from all establishments are used to measure firm growth.

The magnitude of these effects are of economic significance at the margin of growth. For within-state deregulation, the correlation between local deposit growth and mid-sized establishment growth is 80% smaller than it is in the regulated period. For the average MSA market in 1997, I compute the effect on establishments of a fall of .05 (about one standard deviation) in the growth rate of deposits before and after deregulation. Before deregulation, the predicted decrease in establishments is 11, while after deregulation it is 2. This increase of 9 in the number of establishments retained represents 14% of new establishments of this size in the average MSA. When firm growth is measured by employment, deregulation

[2] These effects can be estimated using instrumental variables. I present IV estimates in Appendix D.

[3] An establishment is a physical location for a particular firm. A firm can have many establishments in the same market. The number of establishments is grouped into employee size classes of 1-19, 20-99, and over 100. Bank lending data are not available at the market level.

increases the number of job retained by 780 (1230 minus 450). This represents 11% of employment growth in the average MSA market.[4]

For across-state deregulation in non-MSA markets, the effect of deposit growth on mid-sized establishment growth (20-99 employees) is again 80% smaller after deregulation. Deregulation increases the number of establishments retained in the presence of a one-standard deviation fall in deposit growth. This number is equal to 14.7% of new establishment formation. I find no evidence that this effect varies systematically by establishment sector–manufacturing, services, retail, wholesale, and construction–or by Rajan-Zingales (1998) measures of dependence on external finance.

These results suggest that within and across-state bank expansion play different roles in integrating urban and rural markets. Within-state deregulation appears to have exhausted the gains from bank integration in MSA markets. In contrast, non-MSA markets benefited from across-state deregulation. Regional or national banks may to be more willing or able to dampen the effects of deposit fluctuations in smaller markets.

I find no effects for establishments with 1-19 employees or for establishments with over 100 employees. Larger businesses are less likely to be affected by local credit conditions. The lack of an effect for small establishments is surprising. Businesses with multiple employees should rely in part on bank finance. It is possible that the 1-19 employee category is dominated by the smallest establishments. This category may be also measured with greater error because of inactive businesses. The estimates for mid-sized establishments (20-99 employees) also picks up part of the effect for small establishments (1-19 employees) if the latter change size category as a result of adding workers.

I find weaker evidence that deregulation changes the relationship between outside-market credit supply and firm growth. For each MSA market, I use the average growth rate of deposits in other MSA markets in the state to proxy for the growth of credit supply in outside markets. Before deregulation the effect of outside credit supply is negative. After deregulation there is no effect. This finding suggests that before deregulation, establishments may relocate to markets where the supply of credit is relatively more abundant, but that after deregulation credit supply is perfectly elastic.

There are two major objections to the paper's empirical approach. First, it is possible that deregulation is a consequence of unobserved factors that make local investment opportunities more attractive to outside investors or other nondeposit sources of investment. These unobserved factors could be 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 deregulation, which minimizes the impact of

[4]These comparative statics have the same magnitude and opposite sign for a one-standard deviation increase in the deposit growth rate.

business-cycle-specific causes. I also show that the fall in the coefficient on deposit growth occurs in the first five years after deregulation and does not revert thereafter.

I also address this issue by estimating all effects at the market level. With market-level observations, I am able to use state-year indicator variables to partial out any unobserved effects that are common to all markets in a state in a given year. This specification does not change the magnitude or significance of the main effects. The estimates are still vulnerable to biases from market-specific, unobserved factors that cause outside interest in local investment. However, it is difficult to explain why such factors would be correlated with deregulation, but sufficiently heterogeneous in their impact across a state to cause large biases.

Market-level estimation presents a number of other advantages. It is consistent with evidence that the relevant geographic market for credit for small to medium-sized firms is local (Peterson and Rajan (2002)). It allows for separate identification of the effects of integration across urban and rural markets. It enables the use of within and across-state branching deregulation, respectively, to infer the relative importance of within-state and across-state integration. It also enables tests of cross-market effects within a state.

As a further robustness test, I replicate my results on a subset of states that changed their branching laws as a result of litigation involving the Office of Comptroller of the Currency (OCC) and state regulators. I describe the legal history of this litigation and provide evidence that the timing of the litigation was unrelated to economic conditions in these states. To my knowledge, this is the first paper in the literature to use these litigation outcomes as a further natural experiment.

The second main issue is that deposit growth is a proxy for changes in both the supply and demand for credit. Why should the coefficient on deposit growth measure the effect of credit supply? I reason that if deposit growth is a better proxy for credit demand than credit supply, then deregulation should *increase* the correlation between deposit growth and firm growth. This follows because deregulation should increase the elasticity of credit supply. If credit supply is more elastic, a shift in demand has a larger quantity effect. Therefore, the fact that deposits are an imperfect proxy for credit supply should bias the estimates in the opposite direction from the predicted effects.[5]

This paper informs research on the effect of banking market structure on economic volatility. It directly complements Morgan, Rimes, and Strahan (2004), who provide evidence that across-state branching deregulation led to a fall in the amplitude of state

[5]The use of deposit growth as a proxy for credit supply also presents the issue of how to interpret the reduced form effects. In a simultanous equations setting, the reduced form estimates are a nonlinear function of demand and supply elasticities and shifters. In Appendix C, I provide sufficient conditions under which the coefficient on deposits identifies the sign of the change in the elasticity of credit supply. Under these assumptions the estimates can be directly related to the underlying microeconomic model presented in the paper.

business cycles. I provide empirical evidence for the microeconomic mechanism underlying this effect. I find that *both* across-state and within-state deregulation lower the sensitivity of firm growth to local credit supply in, respectively, non-MSA and MSA markets.

My findings on the relationship between within/across state integration and bank/BHC structure connect two important literatures: (1) the literature on the lending effects of shocks to a bank's balance sheet (Bernanke and Blinder (1988), Peek and Rosengreen (1997, 2000), Jayaratne and Morgan (2000), Kashyap and Stein (2000), Khwaja and Mian (2008), Paravisini (2008)) and (2) the literature on organizational structure and internal capital markets in banks (Houston, James, and Marcus (1997), (Stein (2002)).

This paper contributes to research on the effect of banking market structure on industry structure and performance (Bertrand, Schoar, and Thesmar (2007)). It is related to Becker (2007), who uses the fraction of senior citizens in a market to instrument for local deposits and finds an increase in the number of firms, manufacturing firms, and new firms. Becker finds this effect to be smaller in states after within-state deregulation. My findings on the volatility of growth are related to Black and Strahan (2002), who find an increase in new businesses after deregulation and to Kerr and Nanda (2009), who find evidence of churning as more new firms enter and exit the market. My findings for mid-sized firms are related to Cetorelli and Strahan (2006), who find a relative shift in the size distribution of firms in this direction after deregulation. Finally, my findings that firms respond on the labor margin to local credit conditions are consistent with Blanchard and Katz (1992), who document large, across-state labor flows in response to state-specific macroeconomic shocks.

Section I presents the basic model and its predictions, Section II details the historical background of deregulation, Section III describes the data and empirical analysis, and Section IV concludes.

I An Illustrative Model of Financial Integration

I develop a simple equilibrium model of firms who can access unmonitored debt and loans 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 firms that are reliant on external finance. Credit constrained firms can acquire more expensive funding from a bank. Bank monitoring alleviates a firm's incentive constraint and allows it to raise a larger total of external funds. Banks can only raise deposit funding. This is a simple way of representing a wedge in the cost of deposit and non-deposit funds for small banks that arises from adverse selection (Kashyap and Stein (2000)). I analyze the equilibrium for a single market and compare this to two markets where banks can move funds freely to equate the cost of bank finance across markets. The main results are that

(1) shifts in the supply of deposits have the largest effect on marginal firms who have just enough capital/cash to acquire finance, (2) bank integration dampens the quantity effects of shocks to credit supply, but exacerbates the quantity effects of shocks to credit demand, and (3) bank integration increases the effect of outside-market credit supply/demand movements on local firm growth. The model is an adaptation of Holmstrom and Tirole (1997) to the context of bank integration along the lines of Morgan, Rime, and Strahan (2004).

A *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. 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 credit-constrained due to information asymmetries. In the event of an increase in r_d, such financially constrained firm will be the first to be rationed.

B *Bank Lending with Perfect Monitoring*

I 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:

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

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

I can then define a rate of return for bank lending $r_b = \frac{p_h R_b}{I_b}$ where I_b is the amount of the loan. 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 than is 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:

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

This expression implies that $A(r_d, r_b)$ is increasing in both interest rates. Monitoring will allow more firms to access finance 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 intermediary. As a consequence, there is an agency relationship between a bank that possesses a monitoring technology and depositors who cannot observe payments to the bank from borrowers. An optimal contract between the bank and depositors will provide the bank with an incentive to monitor 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. In the data, delegation costs will be close to zero as a result of deposit insurance and incentives to monitor are provided in part through bank regulation. I limit attention here to the perfect information case, which does not affect the qualitative results. 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 greater access to funds 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 finance if the costs of monitoring are not too high.

C *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 debt. The inelastic supply of deposits is a simple way to model an informational asymmetry between bank managers and non-deposit debt holders of a bank. If there is a wedge between the cost of deposits and other forms of debt, then the supply of deposits can affect lending decisions. Demand for bank finance 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 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:

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

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

D *Equilibrium in Two Integrated Markets*

I next 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 finance are perfectly integrated so that banks can move funds freely across both markets to equalize the rate of return. Let the local stock of deposits 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 deposits employed in a given market.

In Appendix A, I show that 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.[6] Intuitively, integration flattens the credit supply curve for an individual market. As a result, shifts of the supply curve have a smaller effect on equilibrium quantities. Demand shifts, on the other hand, have a larger effect on equilibrium quantities.

The comparative statics of the model can be applied to the context of within and across-state deregulation. First, the model suggests that the effect of local credit supply on firm growth should be smaller in deregulated (integrated) markets. Second, this decrease in the effect of credit supply on firm growth 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. Third, to the extent that empirical measures of local credit supply are correlated with local credit demand, this should bias the empirical findings in the opposite direction from the predicted results. This follows because the effect of credit demand shifts on firm growth should be larger in deregulated (integrated) markets. Fourth, the model implies that, after deregulation, credit supply and demand movements in outside markets affect firm growth in the home market. An increase in the supply of credit in outside markets should raise firm growth in the home market, and an increase in the demand for credit in outside markets should lower firm growth in the home market. If, on the other hand, either firms are not credit constrained or the Modigliani-Miller assumptions hold for banks, then none of these effects should be present.

II Historical Background

In order to test this model, I draw on the history of bank regulation in the United States. I briefly outline the history of within and across-state branching restrictions in the United States in order to highlight the causal factors behind deregulation. I explain the dual banking system, the competitive equality doctrine, and the history of litigation between the Office of the Comptroller of the Currency (OCC) and the states that led a

[6] The price effects of both supply and demand shocks are muted in integrated markets.

subset of states to change their within-state branching laws for relatively exogenous reasons.

A *Within and Across State Bank-Branching Deregulation*

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 the dual banking system and through legal restrictions on across-state bank expansion. The dual banking system has its origins in the National Bank Acts of 1863 and 1864, which created a system of nationally-chartered banks that could compete with state-chartered banks. The OCC regulated nationally-chartered banks, while the state banking authorities regulated state-chartered banks. 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). As a result, across-state banking was virtually nonexistent in the United States until after the Banking Act of 1933 (Glass-Steagall).

After Glass-Steagall, 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 across-state banking organizations. Across-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. Congress finally allowed nation-wide branching with its passage of the Riegle Neal Act in 1994.

While across-state branching restrictions limited across-state bank integration, within-state branching restrictions limited within-state bank integration. State-chartered banks in the eighteenth and early nineteenth centuries were usually prohibited from establishing branches by their charters. 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 these 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 evidence that states did so in response to economic downturns and that states with large manufacturing establishments were more likely to adopt branching reform. There was little change in state 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 within-state branching. 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. States then allowed BHCs to convert their subsidiaries into branches of a single bank and to acquire new branches by merger and acquisition. 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 authors 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 lending 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.

B *The Competitive Equality Doctrine*

States thus changed their within-state and across-state branching laws in response to a variety of political and economic forces. In order to rule out the possibility that these forces account for the relationships that I find in the data, I also consider a subset of states that changed their within-state branching laws in response to litigation. I argue that these changes in the law were largely unrelated to political and economic forces in these states.

The McFadden Act of 1928 and the Glass Steagall Act of 1933 permitted national banks to branch to the extent that state banks were allowed to do so. These statutes formed the basis of the Supreme Court's "competitive equality" doctrine, announced in *First National Bank v. Walker Bank & Trust Company*, 385 U.S. 252 (1966). The Court overturned a decision by the Comptroller of the Currency to permit national banks to establish branches in smaller cities in Utah, where Utah law did not allow states banks to do so. The Court interpreted the McFadden Act and Glass Steagall Act to ensure a competitive equality between national and state banks. In *First National Bank v. Dickinson*, 396 U.S. 122 (1969), the Court held that, when deciding whether an activity constituted branching, they would consider any activity that might give one bank a competitive advantage over another. The competitive equality doctrine thus set the terms of competition between state and national banks.

Because courts adopted an expansive interpretation of branching under the McFadden Act, the Comptroller sought to expand the ability of national banks to branch by arguing that state-chartered savings and loan associations should be considered branches under the

Act. The Comptroller brought this issue before a court in the late 1970s by allowing a national bank to open a branch in contravention of Washington law. At the time Washington allowed savings and loan associations to own multiple branches, but restricted bank branching. The Ninth Circuit Court of Appeals rejected this argument in *Mutschler v. People's National Bank*, 607 F.2d 274 (9th Cir. 1979), holding that savings and loan associations were distinct from commercial banks and that Washington's restriction on national banks did not violate the competitive equality doctrine.

Independent developments in the law made the Comptroller's argument stronger over time. The Garn St. Germain Act of 1982 expanded the ability of banks to provide interest bearing deposit accounts, loans for commercial real estate, and business loans. Then, in *Clarke v. Securities Industry Association*, 479 U.S. 388 (1987), the Supreme Court held that "core banking functions" included, but were not limited to receiving deposits, paying checks, and lending money. The Comptroller subsequently allowed a national bank to open a branch in contravention of Mississippi branching law. At the time, Mississippi allowed thrifts to branch freely. The Comptroller persuaded the Fifth Circuit Court of Appeals to adopt its position in *Department of Banking and Consumer Finance (Deposit Guaranty) v. Clarke*, 809 F.2d 266 (5th Cir. 1987). The court held that savings and loan associations in Mississippi engaged in core banking functions under the Supreme Court's reasoning in *Clarke.* As a result of the court's ruling, national banks were allowed to branch freely in Mississippi. Since national banks were allowed to branch freely, Mississippi allowed state banks to branch freely in 1988.

The decision by the Fifth Circuit led to a series of responses by other states. Tennessee had a "wild card" statute that automatically granted to state banks any powers granted to national banks. Predicting that the court's decision in *Deposit Guaranty* would result in state-wide branching rights for national banks, the Banking Commissioner of Tennessee approved state-wide branching. The Comptroller proceeded with its strategy in other states. Texas approved state-wide branching after national banks were accorded this right in *Texas v. Clarke*, 690 F.Supp. 573 (W.D. Tex. 1988). All told, Alabama, Florida, Indiana, Louisiana, Mississippi, Missouri, New Mexico, Oklahoma, Tennessee, and Texas lifted restrictions on branching by state banks in response to court rulings that allowed national banks to freely branch within those states (Jayaratne and Strahan 1996). As a result of this history, I argue that within-state deregulation in these states was unlikely to be correlated with unobserved state characteristics that alter the relationship between local credit supply and firm growth.

III Data and Empirical Analysis

A Data

I construct a unique panel dataset to test my predictions. The panel consists of MSA and non-MSA (county) markets from the 50 states, excluding Delaware, from 1977-1997. I merge the Summary of Deposits dataset from the Federal Reserve, which contains branch level information on deposits, with the Call Reports Data from the Federal Reserve and the County Business Patterns Database from the U.S. Census to create market-level measures of deposit growth, firm growth, and banking market characteristics such as the k-firm deposit ratio, the number of banks per market, and the Herfindahl index. I include market level and state level economic measures such as per capita income, population, and unemployment from the Bureau of Economic Analysis. Bank lending data are, unfortunately, not available at the market level.

In my data, a state undergoes within-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 across-state deregulation when it allows banks or BHCs outside the state to acquire in-state branches. Table I presents the year of within and across-state deregulation for each state.

B Deregulation and Banking Market Integration

My empirical analysis proceeds in two steps. I first construct measures of banking market integration and show that within-state and across-state branch deregulation led to an increase in within-state and across-state integration. I then use changes in state law to proxy for an increase in integration and test the home-market and cross-market predictions of the model.

Table II illustrates that the substantial industry consolidation in this period took place across markets rather than within markets. Market levels of banking concentration remained constant.[7] Table II 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.

Banking integration *across* markets increased dramatically. Table II illustrates the increase in the level of banking market integration across both MSA and non-MSA markets using three market-level measures. To construct the "Market/State" measure, I divide the

[7] This was likely a result of Federal Reserve and Department of Justice merger policy.

total deposits in a market by the total deposits held in a 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 bank 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 bank 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.

Whether BHCs should be treated as unified lending entities 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 may constitute an internal capital market. The integration measures in the "Bank" column implicitly 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. Both of these measures show a marked increase in the level of banking integration over time.

Deregulation led to an increase in integration. Within-state bank branch deregulation led to an increase in within-state integration, measured at the bank level. Across-state deregulation led to an increase in across-state integration, measured at the BHC level. Figure 1 depicts the bank Market/State measure for MSA markets in Colorado as a function of time. The vertical line at 1991 denotes the year of within-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 (Figure 2), there is little evidence of an increase over time or an effect arising from deregulation. Within-state deregulation thus captures the change from integrating credit markets at the BHC level to integrating at the bank level.[8]

Across-state deregulation, by contrast, led to an increase in across-state bank integration when measured at the BHC level. Across-state deregulation in Colorado in 1988 is associated with an increase in across-state integration when measured at the BHC level (Figure 5) with some evidence for an increase preceding deregulation. When measured at the bank level (Figure 6), there is little change in across-state integration until 1995. It is likely that this increase in integration is due to the Riegle Neal Act of 1994, which

[8] Colorado can be contrasted with California where, as depicted in Figures 3 and 4, neither the bank nor the BHC Market/State ratio changed appreciably over time. California has allowed unlimited branching since 1909.

permitted nation-wide branching.[9] Appendix B provides statistical evidence for the effect of within and across-state deregulation on bank integration that is consistent with the time series evidence for Colorado.

C Deregulation, Local Credit Supply, and Firm Growth

I estimate the effects of deregulation on the relationship between firm growth and local credit supply. The model's predictions are that: (1) before deregulation, the correlation between local credit supply and business growth is greater in regulated states than in unregulated states, and (2) this correlation decreases after deregulation.[10] These effects should be greater for firms that are dependent on bank finance. In order to measure these effects, I estimate equations of the form:

$$y_{mst} = \alpha_m + \alpha_t + \alpha_s t + \beta_0 p_{mst} + \beta_1 x_{mst} + \beta_2 x_{mst} \cdot d_{ms} + \beta_3 x_{mst} \cdot p_{mst} + \boldsymbol{\beta}_4 \mathbf{z}_{mst} + \epsilon_{mst} \quad (1)$$

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 ($\mathbf{z}_{mst}$).[11] This regression captures the effects of within or across-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 within-state and across-state deregulation. For across-state deregulation, β_2 is not identified because every market deregulated during the sample period.

My hypotheses can be stated as follows:

$$\begin{aligned} Within - State\ Deregulation &: \beta_2 > 0, \beta_3 < 0, \beta_2 + \beta_3 = 0 \\ Across - State\ Deregulation &: \beta_3 < 0 \end{aligned}$$

The correlation between deposit growth and firm growth is higher in regulated states

[9] California, which deregulated interstate branching in 1987, shows no increase in its rate of integration when measured at the BHC level (Figure 7). The pattern for California's Bank State/U.S. ratio (Figure 8) is similar to that for Colorado.

[10] In Appendix C, I show that these reduced form predictions can be rationalized by parameter restrictions on a simple, structural model of credit-market equilibrium that follows directly from the microeconomic model.

[11] The market-level covariates include the growth rates of per capita income and population, the 3-firm concentration ratio of deposits, the Herfindahl index, and the number of banks per market. The state-level covariates include the growth rates of population and GDP, as well as the unemployment rate.

($\beta_2 > 0$) and this correlation falls after deregulation ($\beta_3 < 0$). The sum of these coefficients should equal zero if, as a result of deregulation, the association between deposit growth and firm growth reverts to the level observed in states that always had free branching. I use the growth rate of establishments[12] as a measure of firm growth and the growth rate of deposits in a market as a proxy for the local supply of credit. I estimate the model using establishments of different sizes, as measured by the number of employees, in order to capture different levels of external bank dependence. I report empirical estimates of Equation 2 for MSA markets in Table III. 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 within-state and across-state deregulation indicators. Standard errors are clustered at the state level.

In MSA markets, I find evidence of credit constraints for mid-sized establishments (20-90 employees) due to low levels of within-state integration. The positive coefficient of .081 on $GrDeps \cdot Within$ (β_2) indicates that there was a stronger association between local bank deposits and establishment growth in states with within-state branching restrictions compared to states without such restrictions. The negative coefficient of .097 on $GrDeps \cdot Within \cdot Post$ (β_3) indicates that the relationship between deposit growth and establishment growth decreased as a result of deregulation. I cannot reject the null hypothesis that the sum of the two coefficients is 0.

The magnitude of the coefficient of .097 on $GrDeps \cdot Within \cdot Post$ (β_3) 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 in 1997 after deregulation, I compute the effect on establishments of a fall of .05 (about one standard deviation) in the growth rate of deposits before and after deregulation. Before deregulation, the predicted decrease in establishments is 11, while after deregulation it is 2. Deregulation results in 9 more establishments retained. This represents 14% of new establishments of this size in the average MSA. This is an economically significant reduction in the importance of local credit supply at the margin of establishment growth.

I find no evidence that the relationship between deposits and growth changed for establishments with 1-19 employees. This is a somewhat surprising finding. Multiple employee firms are likely to depend in part on bank finance. This may be because the size category is dominated by small establishments that do not utilize bank landing. It is also possible that measurement error is larger for this category. One person establishments might not be economically active. The estimates for mid-sized establishments may also pick up part of the effect for small establishments if the latter change size category as a result of adding

[12] 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.

employees.

In non-MSA markets, I find evidence of credit constraints for mid-sized establishments due to low levels of across-state integration. In Table IV the negative coefficient of .109 on $GrDeps \cdot Across \cdot Post$ (β_3) suggests that 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. For the average non-MSA market in 1997, deregulation increases the number of establishments retained during a fall of .05 in the growth rate of market deposits. The number of establishments retained is 14.7% of new business formation. 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 move into the 20-99 employee class.

Within and across-state bank integration have different effects in MSA and non-MSA markets. For MSA markets, within-state deregulation reduces the dependence of mid-sized firm growth on local credit supply. This finding suggests that within-state bank integration led to an increase in credit flows in response to market-specific shocks. Across-state deregulation, however, had no measurable effect in MSA markets. This finding suggests that conditional on within-state integration, the credit flows enabled by across-state integration are of less importance for firm growth. For non-MSA markets, by contrast, across-state deregulation lowered the dependence of mid-sized firms on local credit supply, while within-state deregulation had no measurable effect. This finding suggests that credit flows enabled by across-state bank 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.

I also estimate these equations using state-year indicator variables to account for state-year-specific, omitted variables that affect firm growth (Columns 4-6 of Tables 3 and 4). By including state-year indicators, I partial out the effect of 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. The coefficients from these regressions are of nearly identical magnitude to the ones described and are statistically significant. In addition, the coefficient on deposit growth for free branching states (β_1) is not statistically different from zero, and the sum of the coefficients for regulating states ($\beta_2 + \beta_3$) is again zero. These results are consistent with the hypothesis that free branching states are completely integrated and that deregulation results in integration. The difference-in-differences estimates using states that were always deregulated and states that changed their branching laws in response to litigation by the OCC are consistent with

the results found for the full sample.[13]

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 instability in the banking sector. Though Kroszner and Strahan (1999) dispute this finding for the case of within-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 investment 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 precisely 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, but still be sufficiently heterogeneous in its impact on these markets to cause large biases after partialling out the common effect. The fact that states that deregulated later had substantial, 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.

It could be argued that these estimates do not contain large biases, but the causality is reversed. Suppose that 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, there should also be a direct effect of deregulation on growth. I find no evidence for such an effect. This interpretation is still consistent with the claim that banking restrictions limit the ability of credit to move freely to equalize returns across markets.

It is also unlikely that these 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. The estimates, 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[14]. This effect is not 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 and long term debt, selling shares, and borrowing on the inter-bank market (Kashyap & Stein (2000)) . What is central to my argument is that such non-deposit funds be raised outside the local market.

[13]These estimates are presented in Tables A-VI and A-VII.

[14]In regressions that I do not report, I show that the fall in the correlation between firm growth and deposit growth takes place within five years of deregulation and is constant thereafter.

I also estimate the effect of deregulation using employment growth and payroll growth to proxy for firm growth. Table V reports the results for these regressions in MSA markets. I again find evidence that in MSA markets within-state deregulation lowered the effect of local credit supply growth on firm growth. The positive coefficient of .056 on $GrDeps \cdot Within$ (β_2) indicates a stronger association between local bank deposits and employment growth in states with within-state branching restrictions. The negative coefficient of .064 on $GrDeps \cdot Within \cdot Post$ (β_3) indicates that the correlation between deposit growth and employment growth decreased as a result of deregulation. These coefficients are again very similar in magnitude and I cannot reject the null hypothesis that they sum to zero. This represents a decrease in magnitude of about 63% of the effect of deposit growth on employment growth. For the average- sized MSA market in 1997, deregulation results in 780 more jobs retained during a one standard deviation fall in the growth rate of deposits. Because the average number of new jobs in the average MSA market is 7100, this represents 11% of employment growth. The magnitude of this effect is consistent with the estimate of 9 establishments retained in the 20-99 employee size class. The results for the effect of within-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 across-state deregulation led to a fall in the effect of deposits on employment growth. The coefficient of .034 on $GrDeps \cdot Across \cdot Post$ (β_3) is statistically significant when estimated with state time trends, but is no longer significant when state-time indicators are included. Table V also reports the analogous estimates for non-MSA markets. There is little evidence that within or across-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 $GrDeps \cdot Within$ (β_2) indicates that there was a stronger association between local bank deposits and payroll growth in states with within-state branching restrictions. The negative coefficient of .052 on $GrDeps \cdot Within \cdot Post$ (β_3) 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 in 1997, deregulation results in payroll retention of around $16,241,000 during one standard deviation fall in the growth rate of deposits. Because the median amount of payroll growth in the average MSA market is $351,650,000, this represents about 4.5% of payroll growth. The magnitude of this effect is consistent with the effects for establishment growth (9 establishments) and employment growth (7100 jobs). When the regression includes state-year indicators, the coefficient on $GrDeps \cdot Within \cdot Post$ (β_3) is of similar magnitude, but is no longer statistically significant. As in the case of employment growth, there is little evidence that

within or across-state deregulation affected the relationship between deposit growth and payroll growth in non-MSA markets.

The difference-in-differences estimates using states that changed their branching laws in response to litigation by the OCC are presented in Tables A-VI and A-VII. These estimates are consistent with the results found for the full sample.

D Deregulation and Outside Market Effects

The model predicts that an increase in outside-market credit supply raises growth in the home market and that an increase in outside-market credit demand lowers growth in the home market. These predictions imply restrictions on the correlation between firm growth and proxies for credit supply and demand in outside markets.[15] For within-state deregulation, I estimate equations of the form:

$$\begin{aligned} y_{mst} &= \alpha_m + \alpha_t + \alpha_s t + \beta_0 p_{mst} + \\ &\quad \beta_1 x_{mst} + \beta_2 x_{mst} \cdot d_{ms} + \beta_3 x_{mst} \cdot p_{mst} + \\ &\quad \beta_4 \overline{x}_{mst} + \beta_5 \overline{x}_{mst} \cdot d_{ms} + \beta_6 \overline{x}_{mst} \cdot p_{mst} + \\ &\quad \beta_7 \overline{y}_{mst} + \beta_8 \overline{y}_{mst} \cdot d_{ms} + \beta_9 \overline{y}_{mst} \cdot p_{mst} + \\ &\quad \boldsymbol{\beta}_4 \mathbf{z}_{mst} + \epsilon_{mst} \end{aligned} \tag{2}$$

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 ($x_{mst} \cdot p_{mst}$), the average growth rate of deposits in other MSA markets in the state ($\overline{x}_{mst}$), average firm growth in other MSA markets in the state ($\overline{y}_{mst}$), and a vector of market and state level covariates ($\mathbf{z}_{mst}$).

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

$$Within - State\ Deregulation : \beta_6 > 0, \beta_9 < 0$$

Deregulation raises the correlation between outside-market deposit supply and local firm growth ($\beta_6 > 0$) , and lowers the correlation between outside-market credit demand–proxied by outside firm growth–and local firm growth ($\beta_9 < 0$). Table VI reports the

[15] In the Appendix, I show that these reduced form predictions can be rationalized by parameter restrictions on a simple, structural model of pre and post-deregulation credit-market equilibrium that follows directly from the microeconomic model.

results when firm growth is measured by establishment growth.[16] I use the average growth rate of deposits in other MSA markets in the state ($GrDepsOther$) to proxy for the growth of credit supply in outside markets.

The prediction that the coefficient on $GrDepsOther \cdot Within \cdot Post$ (β_6) is positive, which implies that within-state integration increases the effect of outside-market credit supply on firm growth in the home market. I find evidence that this is true for establishments with 1-19 employees and establishments with 20-99 employees in MSA markets, and for establishments with over 100 employees in non-MSA markets. The coefficient on $GrDepsOther \cdot Within$ (β_5) is negative, which suggests that before deregulation there is some relocation of firms to markets where the supply of credit is relatively more abundant. For both small and medium-sized firm, the total effect of outside-market deposit growth ($\beta_5 + \beta_6$) is statistically indistinguishable from zero after deregulation. It is likely that, after deregulation, the presence of large banking organizations removes the effect of state-level deposit supply on firm growth.

The prediction that the coefficient on $GrEstabOther \cdot Within \cdot Post$ (β_9) < 0 implies that within-state integration lowers the effect of outside-market credit demand on firm growth in the home market. I find evidence that this is true for small and mid-sized establishments in MSA markets and for mid-sized and large establishments in non-MSA markets. This effect is the opposite of what one would predict if deregulation led to the real integration of the state economy through trade or common specialization. If real integration occurred, the correlation between growth in different markets should increase after deregulation. The fall in this correlation suggests that the integration taking place was largely financial. That firm growth in outside markets lowers firm growth in the home market illustrates the potentially negative consequences of bank integration. The integration of credit markets can have adverse consequences when the variation in credit conditions across markets is driven by market failures rather than by supply and demand.

IV Conclusion

This paper uses the timing of within and across-state bank branch deregulation to estimate the effect of bank integration on the sensitivity of firm growth to local credit supply. Using a difference-in-differences framework, I find that within-state deregulation lowers the sensitivity of growth to local credit supply in MSA markets for mid-sized establishments (20-99 employees). Across-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 within-state deregulation in MSA markets are consistent with

[16] Table VII reports these results when firm growth is measured by employment growth and payroll growth.

those found for establishment growth. I find weaker evidence that deregulation changes the relationship between outside-market credit supply and establishment growth. Before deregulation the effect of outside credit supply is negative. After deregulation there is no effect. It is possible that before deregulation, there is some relocation of establishments to markets where the supply of credit is relatively more abundant.

These empirical findings have implications for the literature on the effects of banking market structure on firm growth. They provide microfoundations for the link between greater banking market integration and lower economic volatility (Morgan, Rime, & Strahan (2004)). They suggest that within-state credit 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 bank integration has little impact. Across-state credit flows, in contrast, may play a role 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 to such shocks. Because 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 legal/institutional structure of firms and their internal capital markets. Finally, 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 as responses to market-specific credit shocks.

V Appendix

A Proofs of Propositions in Model

I first present the comparative statics for the single market model.

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

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:

$$\frac{\partial r_b(K_b, r_d)}{\partial K_b} = \{\frac{\partial D_b(r_d, r_b(K_b, r_d))}{\partial r_b}\}^{-1} =$$

$$\{(F(A(r_d)) - F(A(r_d, r_b(K_b, r_d)))) \cdot \frac{dI_b(r_b(K_b, r_d))}{dr_b} -$$

$$I_b(r_b(K_b, r_d)) \cdot F(A(r_d, r_b(K_b, r_d))) \cdot \frac{\partial A(r_d, r_b(K_b, r_d))}{\partial r_b}\}^{-1} =$$

$$\{(+)(-) \quad - \quad (+)(+)(+)\}^{-1} = (-)$$

.

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 loans raises/lowers the equilibrium price of bank finance but leaves the equilibrium quantity of bank lending 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 bank loans 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

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

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

In the single market case, the demands for bank loans and unmonitored debt 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 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 can be seen 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 is ambiguous because, while the set of firms who can access external finance grows smaller ($\frac{\partial A(r_d, r_b(K_b, r_d))}{\partial r_b} > 0$), the amount of unmonitored debt for firms who do receive finance increases ($I'(r_b) < 0$). This implies that the effect of an increase in the local supply of deposits (K_b) on the demand for unmonitored debt is ambiguous. Despite this ambiguity for the effect on unmonitored debt, the total market demand for external finance–debt plus bank loans–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 deposits lowers/raises the equilibrium price of bank lending and increases/decreases the demand for bank loans, 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 deposits ϵ that is initially set to zero:

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

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

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

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

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

$$\frac{\partial \theta(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} = -\tfrac{1}{2} \cdot ((K_1 + K_2)^{-1} \Rightarrow \quad \text{(using (3))}$$

$$\frac{\partial r_b(r_d, K_1 + K_2, \epsilon)}{\partial \epsilon} = \tfrac{1}{2} \cdot \{\frac{\partial D_b(r_d, r_b(r_d, K_1 + K_2, \epsilon))}{\partial r_b}\}^{-1} = (-)$$

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

Proposition 4 *In an integrated market, an increase/decrease in the demand for bank loans 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 bank lending in market one is given by:

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

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

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

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

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

Proposition 5 *In an integrated market, an increase/decrease in the demand for bank loans increases/decreases the equilibrium quantity of bank lending, and 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. $\blacksquare$

B Effect of Deregulation on Financial Integration

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

$$y_{mst} = \alpha_m + \alpha_t + \alpha_s t + \beta_1 p_{mst} + \beta_2 p_{mst} \cdot t + \boldsymbol{\beta}_3 \mathbf{z}_{mst} + \ \epsilon_{mst} \quad (3)$$

Each observation corresponds to a given market/state/year, where a market is defined to be a 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 within-state and across-state deregulation as the treatment indicators.

Table A-I presents the evidence for within-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 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 A-II presents the evidence for across-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) within-state bank branch deregulation led to an increase in within-state bank integration measured at the bank level and (2) across-state deregulation led to an increase in across-state bank integration measured at the BHC level.

C Econometric Model of Credit Market Equilibrium

C.1 *Home Market Effects*

I develop an econometric model that rationalizes the reduced-form equations estimated in the paper. Consider a simple, statistical analogue of the credit market equilibrium presented in the model:

$$
\begin{aligned}
Q_i^d &= \gamma_0 + \varepsilon^d p_i^* + \gamma_1 x_i + \gamma_2 z_i + \epsilon_i^d \\
Q_i^s &= \alpha_0 + \varepsilon^s p_i^* + \alpha_1 x_i + \alpha_2 z_i + \epsilon_i^s \\
Q_i^s(p_i^*) &= Q_i^d(p_i^*) = Q_i^*
\end{aligned}
$$

where Q_i^d and Q_i^s are the log of quantities of credit demand and supply, p_i is the log of price so that ε^d and ε^s are elasticities of demand and supply, x_i is the quantity of deposits in the market, and z_i is a demand/supply shifter such as income. The parameter α_1 can be interpreted as the marginal propensity to lend to local firms from deposits. I assume that:

$$\begin{aligned} E(\epsilon_i^d \mid p_i, x_i, z_i) &= 0 \\ E(\epsilon_i^s \mid p_i, x_i, z_i) &= 0 \end{aligned}$$

The reduced form of this model is given by:

$$Q_i^* = \beta_0 + \beta_1 x_i + \beta_2 z_i + \nu_i$$

where β_0, β_1,and β_2 are functions of the underlying parameters of interest and are identified under the above assumptions. The coefficient β_1, which captures the relationship between deposits and output can be expressed as:

$$\beta_1 = \frac{dQ_i^*}{dx_i} = \frac{\partial Q_i^*}{\partial x_i} + \frac{\partial Q_i^*}{\partial p_i^*}\frac{\partial p_i^*}{\partial x_i} = \alpha_1 + \varepsilon^s(\frac{\alpha_1 - \gamma_1}{\varepsilon^d - \varepsilon^s})$$

In other words, the effect of a change in deposits on the equilibrium quantity of credit is determined by the shift in the supply curve (α_1 or the marginal propensity to lend) and the movement along the supply curve ($\frac{\alpha_1-\gamma_1}{\varepsilon^d-\varepsilon^s} < 0$). I assume that $\alpha_1 - \gamma_1 > 0$, that is, conditional on market covariates, deposits are a larger shifter of credit supply than of credit demand. I then consider the effect of bank integration on the equilibrium relationship between deposits and output.

In the theoretical model presented above, the effect of bank integration is to flatten the supply curve of credit ($\Delta\varepsilon^s > 0$). It can be shown that $\frac{d\beta_1}{d\varepsilon^s} < 0$, so that bank integration lowers the equilibrium association between deposits and output. The sign of the effect of bank integration on the relationship between integration and output is identified under the assumption that the other structural parameters do not change. This may not be a reasonable assumption[17]. It is likely that the marginal propensity to lend also falls after integration ($\Delta\alpha_1 < 0$), which implies that, post deregulation, $\frac{-d\beta_1}{d\alpha_1} < 0$. As a result, an increase in supply elasticity and a decrease in the marginal propensity to lend cannot be distinguished by an observed fall in the reduced form coefficient (β_1). Both changes, however, are consistent with the argument that local credit supply matters less

[17] I will assume that the effect of integration on demand-side parameters is small, or small relative to changes in the supply-side parameters ($\Delta\varepsilon^d \approx 0, \Delta\gamma_1 \approx 0$).

after integration. I estimate the reduced-form coefficient using growth rates in order to better deal with trends. The comparative statics of the reduced form coefficients can thus be rationalized by a structural model of credit market equilibrium.

C.2 *Cross Market Effects*

I next consider a model that captures the cross-market effects of bank integration. Rather than modeling deregulation through comparative statics with respect to the underlying parameters, I model deregulation as a change in the underlying equilibrium. The pre-deregulation equilibrium is defined as above. After deregulation, a statistical analogue of the credit market equilibrium between two integrated markets is defined as:

$$\begin{aligned} Q^d &= Q^{d1} + Q^{d2} \\ Q^s &= Q^{s1} + Q^{s2} \\ Q^d(p^*) &= Q^s(p^*) = Q^*(p^*) \end{aligned}$$

The reduced form of this model for market 1 is given by:

$$Q_i^{*d1} = \beta_0^{post} + \beta_1^{post} x_i^1 + \beta_2^{post} z_i^1 + \beta_3^{post} x_i^2 + +\beta_4^{post} z_i^2 + v_i$$

where x_i^1 is the quantity of deposits in market 1, z_i^1 is a demand/supply shifter in market 1 such as income, and the variables are defined analogously for market 2. The coefficients in this equation, which are functions of the underlying structural parameters, are identified under the same assumptions as the single market case. The coefficient β_1^{post}, which captures the relationship between deposits and output can be expressed as:

$$\beta_1^{post} = \frac{dQ_i^{*d1}}{dx_i^1} = \frac{\partial Q_i^{*d1}}{\partial x_i^1} + \frac{\partial Q_i^{*d1}}{\partial p_i^*}\frac{\partial p_i^*}{\partial x_i^1} = \gamma_1^1 + \varepsilon^{d1}(\frac{\alpha_1^1 - \gamma_1^1}{(\varepsilon^{d1} + \varepsilon^{d2}) - (\varepsilon^{s1} + \varepsilon^{s2})})$$

The analogous expression for the pre-deregulation equilibrium is given by:

$$\beta_1^{pre} = \frac{dQ_i^{*d1}}{dx_i^1} = \frac{\partial Q_i^{*d1}}{\partial x_i^1} + \frac{\partial Q_i^{*d1}}{\partial p_i^*}\frac{\partial p_i^*}{\partial x_i^1} = \gamma_1^1 + \varepsilon^{d1}(\frac{\alpha_1^1 - \gamma_1^1}{(\varepsilon^{d1} - \varepsilon^{s1})})$$

By inspection, it follows that $\beta_1^{post} < \beta_1^{pre}$, that is, the reduced form correlation between deposits and output is lower after deregulation. The cross-market effects are given by β_3^{post}

and β_4^{post}.

$$\begin{aligned}
\beta_3^{post} &= \frac{dQ_i^{*d1}}{dx_i^2} = \varepsilon^{d1}\left(\frac{\alpha_1^2 - \gamma_1^2}{(\varepsilon^{d1} + \varepsilon^{d2}) - (\varepsilon^{s1} + \varepsilon^{s2})}\right) = (+) \\
\beta_4^{post} &= \frac{dQ_i^{*d1}}{dz_i^2} = \varepsilon^{d1}\left(\frac{\alpha_2^2 - \gamma_2^2}{(\varepsilon^{d1} + \varepsilon^{d2}) - (\varepsilon^{s1} + \varepsilon^{s2})}\right) = (-)
\end{aligned}$$

I assume that deposits are, conditional on other covariates, more important to credit supply than credit demand ($\alpha_1^2 - \gamma_1^2 > 0$) and that income is, conditional on other covariates, more important to credit demand than credit supply ($\alpha_2^2 - \gamma_2^2 < 0$). I assume that $\beta_3^{pre} \approx \beta_4^{pre} \approx 0$ so the sign of the *post* coefficients determines the sign of the marginal effects. In other words, a shift in outside market credit supply raises output in the home market ($\beta_3^{post} > 0$) and a shift in outside market credit demand in the home market lowers output in the home market ($\beta_4^{post} < 0$). The change in the reduced form coefficients as a result of deregulation can thus be rationalized by a structural model of credit market equilibrium.

D Instrumental Variables Estimation

As another interpretive strategy, I estimate the effect of bank integration on the relationship between credit supply and firm growth using within and across-state deregulation to instrument for within and across-state integration. I first use OLS to estimate equations of the form:

$$y_{mst} = \alpha_m + \alpha_t + \alpha_s t + \beta_1 x_{mst} + \beta_2 i_{mst} + \beta_3 x_{mst} \cdot i_{mst} + \boldsymbol{\beta}_4 \mathbf{z}_{mst} + \epsilon_{mst} \tag{4}$$

I regress measures of firm growth (y_{mst}) on the growth rate of bank deposits (x_{mst}), a measure of bank integration (i_{mst}), the interaction between deposit growth and bank 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 bank integration and the interaction between deposit growth and bank integration. My model predicts that $\beta_3 < 0$. As the level of bank 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 bank integration and have a positive impact on firm growth, the OLS estimates of β_3 should be biased upward. Since the within and across-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. The IV estimates rescale the estimates from the difference-in-differences regressions when the effect of only one set of deregulations is estimated.

When the dependent variable is the growth rate of establishments, the IV results are largely consistent with the prediction that an increase in bank integration lowers the dependence of smaller, potentially credit-constrained firms on local credit supply. Table A-III reports the OLS and IV results for MSA and non-MSA markets using the Market/State measure of within-state bank integration. The first stages for the IV regressions are reported in Column 2 of Table A-I and Column 5 of Table A-II. The IV regressions provide evidence that, for establishments with 20-99 employees in MSA markets, the increase in bank integration due to within-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 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 bank 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 across-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 A-IV reports the OLS and IV results for MSA and non-MSA markets using the State/U.S. measure of across-state bank 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 across-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 across-state and within-state deregulations. The IV results imply that across-state bank 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 bank integration on the sensitivity of firm growth to local credit supply. Table A-V 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 A-V also 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 within or across-state deregulation. As stated above, it is likely that the IV regressions are unable to distinguish the effect of within and across-state deregulation.

E Appendix Tables

Table A-I

Change in Market/State Deposit Ratio After Within State Branching Deregulation

	Dependent Variable - Market/State Ratio					
	Treatment - Within State Deregulation					
	Banks			BHCs		
	(1)	(2)	(3)	(4)	(5)	(6)
MSA						
Within*Post	0.1892***	0.1658***	0.1823***	0.0083	0.0014	0.0053
	(0.0588)	(0.0562)	(0.0552)	(0.0152)	(0.0163)	(0.0162)
Within*Post*Time	0.0336*	0.0291	0.026	-0.0134**	-0.0172**	-0.0138*
	(0.0184)	(0.0248)	(0.0235)	(0.0058)	(0.0078)	(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						
Within*Post	0.1227***	0.0982***	0.1050***	0.0435**	0.0374*	0.0402**
	(0.0212)	(0.0170)	(0.0203)	(0.0197)	(0.0193)	(0.0192)
Within*Post*Time	0.0175***	0.0427***	0.0373***	0.0172***	0.0145*	0.0138*
	(0.0051)	(0.0081)	(0.0076)	(0.0063)	(0.0073)	(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 A-II

Change in State/U.S. Deposit Ratio After Across State Branching Deregulation

	Dependent Variable - State/U.S. Ratio					
	Treatment - Across State Deregulation					
	Banks			BHCs		
	(1)	(2)	(3)	(4)	(5)	(6)
MSA						
Across*Post	-0.0151	-0.0064	-0.0034	0.1428***	0.1289***	0.1192***
	(0.0093)	(0.0092)	(0.0095)	(0.0361)	(0.0363)	(0.0358)
Across*Post*Time	-0.0128	-0.0140	-0.0096	0.0794***	0.0795***	0.0771***
	(0.0091)	(0.0105)	(0.0085)	(0.0201)	(0.0213)	(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						
Across*Post	-0.0191***	-0.0147**	-0.0151**	0.0666***	0.0646***	0.0585***
	(0.0063)	(0.0061)	(0.0066)	(0.0167)	(0.0156)	(0.0150)
Across*Post*Time	-0.0136***	-0.0153**	-0.0130**	0.0500***	0.0508***	0.0441***
	(0.0048)	(0.0059)	(0.0054)	(0.0105)	(0.0105)	(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 A-III

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						
GrDeps	0.0341***	0.0621*	0.0818**	0.0485	0.2071***	0.1135
	(0.0116)	(0.0314)	(0.0367)	(0.0343)	(0.0797)	(0.1471)
Integration	0.0054**	0.0014	0.0000	0.0123	-0.0146	0.0120
	(0.0025)	(0.0069)	(0.0073)	(0.0096)	(0.0292)	(0.0266)
GrDeps*Integration	-0.0154	-0.0423	-0.1225**	-0.0384	-0.2711**	-0.1728
	(0.0166)	(0.0381)	(0.0602)	(0.0527)	(0.1121)	(0.2161)
N	6,995	7,025	7,027	6,995	7,025	7,027
R-sq	0.81	0.34	0.21			
NonMSA						
GrDeps	0.0524***	0.0974***	0.0320	0.0628***	0.2411***	0.1317
	(0.0051)	(0.0221)	(0.0326)	(0.0217)	(0.0909)	(0.0966)
Integration	0.0022*	-0.0028	0.0008	-0.0043	0.0355	-0.0031
	(0.0012)	(0.0047)	(0.0067)	(0.0139)	(0.0303)	(0.0371)
GrDeps*Integration	-0.0321***	-0.0426	-0.0136	-0.0542	-0.3573**	-0.2297
	(0.0086)	(0.0357)	(0.0584)	(0.0448)	(0.1654)	(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 A-IV

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						
GrDeps	0.0345***	0.0836***	0.0362	0.0486***	0.1203***	0.1012*
	(0.0073)	(0.0256)	(0.0363)	(0.0128)	(0.0332)	(0.0613)
Integration	0.0021	0.0031	-0.0073	0.0123	-0.0321	-0.0334
	(0.0024)	(0.0058)	(0.0086)	(0.0104)	(0.0308)	(0.0315)
GrDeps*Integration	-0.0240	-0.1136***	-0.0740	-0.0584**	-0.1952***	-0.2231*
	(0.0148)	(0.0402)	(0.0587)	(0.0282)	(0.0607)	(0.1183)
N	6,995	7,025	7,027	6,995	7,025	7,027
R-sq	0.81	0.34	0.21			
NonMSA						
GrDeps	0.0480***	0.0920***	0.0203	0.0501***	0.1487***	0.0862**
	(0.0055)	(0.0193)	(0.0271)	(0.0084)	(0.0300)	(0.0398)
Integration	0.0022*	-0.0050	-0.0085	-0.0395*	-0.0811*	-0.0757
	(0.0011)	(0.0044)	(0.0070)	(0.0228)	(0.0489)	(0.0502)
GrDeps*Integration	-0.0487***	-0.0649	0.0282	-0.0476	-0.3090***	-0.2626*
	(0.0109)	(0.0470)	(0.0703)	(0.0357)	(0.1183)	(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 A-V

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

	Dependent Variables - Growth Rate of Employment and Payroll							
	Market/State Integration Measure				State/U.S. Integration Measure			
	OLS Regression		IV (Within State)		OLS Regression		IV (Across State)	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)	Empl (5)	Payroll (6)	Empl (7)	Payroll (8)
MSA								
GrDeps	0.0959***	0.1013***	0.1618***	0.1256***	0.0639***	0.0725***	0.1095***	0.1037***
	(0.0173)	(0.0206)	(0.0452)	(0.0403)	(0.0159)	(0.0178)	(0.0243)	(0.0234)
Integration	0.0055	0.0080	0.0002	0.0026	0.0004	0.0034	-0.0307	-0.0138
	(0.0057)	(0.0064)	(0.0179)	(0.0213)	(0.0045)	(0.0050)	(0.0190)	(0.0159)
GrDeps*Integration	-0.1076***	-0.1196***	-0.2115***	-0.1579***	-0.0850***	-0.1104***	-0.1878***	-0.1814***
	(0.0245)	(0.0276)	(0.0642)	(0.0601)	(0.0300)	(0.0291)	(0.0502)	(0.0510)
N	7,021	7,017	7,021	7,017	7,021	7,017	7,021	7,017
R-sq	0.56	0.59			0.56	0.59		
NonMSA								
GrDeps	0.0687***	0.0951***	0.0985***	0.1651***	0.0592***	0.0909***	0.0776***	0.1237***
	(0.0105)	(0.0154)	(0.0244)	(0.0339)	(0.0088)	(0.0108)	(0.0108)	(0.0158)
Integration	0.0024	0.0041	0.0040	0.0259	-0.0022	-0.0001	-0.0555*	-0.0437
	(0.0021)	(0.0029)	(0.0257)	(0.0311)	(0.0018)	(0.0030)	(0.0288)	(0.0377)
GrDeps*Integration	-0.0457***	-0.0426**	-0.1108**	-0.1966***	-0.0528**	-0.0716***	-0.1251***	-0.2131***
	(0.0151)	(0.0211)	(0.0473)	(0.0578)	(0.0207)	(0.0189)	(0.0405)	(0.0481)
N	41,073	41,070	41,071	41,067	41,073	41,070	41,071	41,067
R-sq	0.19	0.22			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 and State/US measures 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 within-state (columns 1-4)/across-state (columns 5-8) deregulation to instrument within-state/across-state 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 A-VI

Growth Rate of Establishments After Within & Across State Branching Deregulation

	Dependent Variable - Growth Rate of Establishments Across Employee Size					
	Treatment - Within and Across State Deregulation					
	MSA			NonMSA		
	1-19 Emp (1)	20-99 Emp (2)	100+ Emp (3)	1-19 Emp (4)	20-99 Emp (5)	100+ Emp (6)
Litigation States						
GrDeps	0.0292*	0.0423	0.049	0.0335**	0.1525**	0.0349
	(0.0144)	(0.0302)	(0.0563)	(0.0130)	(0.0602)	(0.0612)
GrDeps*Within	0.0142	0.0917***	-0.002	0.0409**	-0.0004	0.1281*
	(0.0164)	(0.0276)	(0.0972)	(0.0170)	(0.0706)	(0.0708)
GrDeps*Within*Post	-0.0074	-0.1073***	-0.0061	-0.0342	0.041	-0.1456
	(0.0189)	(0.0330)	(0.1061)	(0.0215)	(0.0664)	(0.0970)
Within*Post	0.0054*	0.0114	-0.0083	0.0015	0.0085	0.0049
	(0.0030)	(0.0072)	(0.0095)	(0.0032)	(0.0085)	(0.0069)
GrDeps*Across*Post	-0.0126	-0.0259	-0.027	-0.0119	-0.1458**	-0.0386
	(0.0143)	(0.0443)	(0.0587)	(0.0198)	(0.0608)	(0.0870)
Across*Post	0.0039	-0.0019	-0.0061	0.0036	0.0138	-0.0004
	(0.0031)	(0.0066)	(0.0111)	(0.0024)	(0.0141)	(0.0092)
N	3,449	3,472	3,473	19,335	19,393	19,231
R-sq	0.82	0.4	0.22	0.43	0.07	0.05

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 A-VII

Growth Rate of Employment & Payroll After Within & Across State Branching Deregulation

	Dependent Variable - Growth Rate of Employment and Payroll			
	Treatment - Within and Across State Deregulation			
	MSA		NonMSA	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)
Litigation States				
GrDeps	0.0368**	0.0015	0.0446*	0.0649**
	(0.0161)	(0.0237)	(0.0223)	(0.0242)
GrDeps*Within	0.0525*	0.1113***	0.0617*	0.0751**
	(0.0268)	(0.0345)	(0.0307)	(0.0274)
GrDeps*Within*Post	-0.0551	-0.0670	-0.0420	-0.0932***
	(0.0377)	(0.0424)	(0.0376)	(0.0309)
Within*Post	0.0040	-0.0004	0.0102*	0.0079
	(0.0065)	(0.0073)	(0.0049)	(0.0058)
GrDeps*Across*Post	-0.0229	-0.0238	-0.0229	-0.0103
	(0.0205)	(0.0256)	(0.0271)	(0.0292)
Across*Post	-0.0055	-0.0054	-0.0029	-0.0014
	(0.0033)	(0.0036)	(0.0063)	(0.0077)
N	3,471	3,469	19,377	19,350
R-sq	0.59	0.64	0.20	0.22

Notes: The table presents an OLS regression of the growth rate of employment and payroll 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%

VI Tables

Table I

Deregulation of Bank Branching by State

State	Year of Deregulation		State	Year of Deregulation	
	Across State	Within State		Across State	Within 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 II

Banking Market Characteristics

	Average Market Characteristics					Bank Integration			BHC Integration		
	Pop	3-Firm	Herf	Banks	Markets	Mkt/St	Multi	St/US	Mkt/St	Multi	St/US
MSA											
1977	466,967	0.69	0.22	18.9	362	0.32	0.33	0.00	0.61	0.54	0.10
		(0.17)	(0.11)	(28.2)		(0.40)	(0.39)	(0.02)	(0.38)	(0.35)	(0.25)
1982	493,581	0.67	0.21	18.9	362	0.41	0.38	0.00	0.66	0.61	0.12
		(0.16)	(0.10)	(27.6)		(0.41)	(0.40)	(0.01)	(0.37)	(0.35)	(0.26)
1987	493,581	0.69	0.22	18.9	362	0.50	0.48	0.00	0.78	0.74	0.34
		(0.15)	(0.10)	(25.5)		(0.41)	(0.38)	(0.01)	(0.26)	(0.25)	(0.31)
1992	556,030	0.70	0.22	18.0	362	0.66	0.62	0.00	0.81	0.78	0.55
		(0.15)	(0.10)	(21.8)		(0.34)	(0.31)	(0.04)	(0.22)	(0.21)	(0.30)
1997	592,037	0.69	0.21	17.0	363	0.79	0.77	0.41	0.83	0.83	0.56
		(0.13)	(0.10)	(18.0)		(0.24)	(0.22)	(0.34)	(0.21)	(0.18)	(0.28)
Non-MSA											
1977	20,720	0.90	0.45	4.0	2,256	0.23	0.21	0.00	0.36	0.28	0.06
		(0.14)	(0.25)	(2.9)		(0.38)	(0.36)	(0.00)	(0.44)	(0.38)	(0.21)
1982	21,529	0.90	0.44	4.1	2,265	0.26	0.24	0.00	0.43	0.34	0.07
		(0.14)	(0.24)	(2.8)		(0.40)	(0.38)	(0.00)	(0.45)	(0.39)	(0.22)
1987	24,189	0.90	0.44	4.0	2,272	0.34	0.31	0.00	0.57	0.48	0.14
		(0.14)	(0.24)	(2.8)		(0.42)	(0.39)	(0.01)	(0.42)	(0.39)	(0.27)
1992	22,311	0.90	0.43	4.1	2,262	0.51	0.44	0.00	0.67	0.59	0.26
		(0.13)	(0.23)	(2.7)		(0.40)	(0.38)	(0.01)	(0.37)	(0.36)	(0.35)
1997	23,565	0.89	0.42	4.3	2,262	0.68	0.60	0.19	0.77	0.70	0.35
		(0.13)	(0.23)	(2.67)		(0.35)	(0.36)	(0.33)	(0.30)	(0.32)	(0.36)

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. "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 III

Growth Rate of Establishments After Within & Across-State Branching Deregulation

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

Growth Rate of Establishments After Within & Across State Branching Deregulation

	Dependent Variable - Growth Rate of Establishments Across Employee Size					
	Treatment - Within and Across State Deregulation					
	State Time Trends			State/Year Indicators		
	1-19 Emp (1)	20-99 Emp (2)	100+ Emp (3)	1-19 Emp (4)	20-99 Emp (5)	100+ Emp (6)
NonMSA						
GrDeps	0.0349***	0.1381***	0.0436	0.0328***	0.1034**	0.0107
	(0.0098)	(0.0493)	(0.0484)	(0.0113)	(0.0403)	(0.0580)
GrDeps*Within	0.0168	-0.0003	0.0461	0.0138	0.0199	0.0852
	(0.0138)	(0.0571)	(0.0548)	(0.0149)	(0.0471)	(0.0723)
GrDeps*Within*Post	-0.0120	0.0043	-0.0516	-0.0096	-0.0176	-0.0666
	(0.0139)	(0.0471)	(0.0608)	(0.0149)	(0.0471)	(0.0807)
Within*Post	0.0018	0.0054	0.0059			
	(0.0018)	(0.0059)	(0.0059)			
GrDeps*Across*Post	-0.0095	-0.1090***	-0.0533	-0.0088	-0.0814**	-0.0290
	(0.0122)	(0.0384)	(0.0589)	(0.0113)	(0.0373)	(0.0636)
Across*Post	0.0024	0.0105	0.0005			
	(0.0016)	(0.0064)	(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 V

Growth Rate of Employment & Payroll After Within & Across State Branching Deregulation

	Dependent Variable - Growth Rate of Employment and Payroll							
	Treatment - Within and Across State Deregulation							
	State Time Trends		State/Year Indicators		State Time Trends		State/Year Indicators	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)
MSA/NonMSA								
GrDeps	0.0447***	0.0071	0.0326**	-0.0030	0.0417**	0.0839***	0.0314	0.0732***
	(0.0132)	(0.0196)	(0.0132)	(0.0201)	(0.0201)	(0.0234)	(0.0204)	(0.0189)
GrDeps*Within	0.0561**	0.0989***	0.0512**	0.0937***	0.0260	0.0369	0.0131	0.0148
	(0.0235)	(0.0282)	(0.0202)	(0.0315)	(0.0248)	(0.0299)	(0.0247)	(0.0267)
GrDeps*Within*Post	-0.0639**	-0.0515*	-0.0552**	-0.0444	-0.0177	-0.0367	-0.0116	-0.0355
	(0.0262)	(0.0283)	(0.0263)	(0.0366)	(0.0222)	(0.0275)	(0.0203)	(0.0288)
Within*Post	0.0061	0.0013			0.0038	0.0015		
	(0.0040)	(0.0044)			(0.0032)	(0.0031)		
GrDeps*Across*Post	-0.0343**	-0.0388*	-0.0278	-0.0276	-0.0119	-0.0377*	0.0014	-0.0195
	(0.0144)	(0.0201)	(0.0190)	(0.0245)	(0.0173)	(0.0194)	(0.0164)	(0.0197)
Across*Post	-0.0005	0.0000			0.0007	0.0063		
	(0.0030)	(0.0031)			(0.0032)	(0.0038)		
N	7,021	7,017	7,021	7,017	41,073	41,070	41,073	41,070
R-sq	0.56	0.59	0.65	0.68	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 MSA and non-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 VI

Growth Rate of Establishments After Within & Across State Branching Deregulation

	Dependent Variable - Growth Rate of Establishments Across Employee Size					
	Treatment - Within and Across State Deregulation					
	MSA			NonMSA		
	1-19 Emp (1)	20-99 Emp (2)	100+ Emp (3)	1-19 Emp (4)	20-99 Emp (5)	100+ Emp (6)
GrDepsOther	-0.0052	0.0059	-0.0104	-0.0122**	-0.0318	0.0476***
	(0.0097)	(0.0156)	(0.0453)	(0.0051)	(0.0290)	(0.0164)
GrDepsOther*Within	-0.0789***	-0.1279***	-0.0514	-0.0731**	-0.0529	-0.2667***
	(0.0274)	(0.0458)	(0.0834)	(0.0282)	(0.0606)	(0.0688)
GrDepsOther*Within*Post	0.1014***	0.1027*	-0.041	0.0535*	0.1071	0.2020**
	(0.0280)	(0.0545)	(0.0791)	(0.0285)	(0.0700)	(0.0960)
GrEstabOther	0.1058***	0.1401**	0.1195*	0.0401	-0.0219	0.0743
	(0.0392)	(0.0614)	(0.0674)	(0.0466)	(0.1207)	(0.0592)
GrEstabOther*Within	-0.0233	-0.0584	-0.0874	0.0345	0.0716	0.0547
	(0.0350)	(0.0613)	(0.0727)	(0.0436)	(0.1175)	(0.0621)
GrEstabOther*Within*Post	-0.1027**	-0.1839***	0.0162	-0.0426	-0.3637***	-0.1825**
	(0.0425)	(0.0632)	(0.0742)	(0.0371)	(0.1190)	(0.0786)
N	6,919	6,949	6,951	41,091	41,045	40,902
R-sq	0.81	0.35	0.21	0.41	0.07	0.05

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, the average growth rate of market deposits in other MSA markets in the state, and the average growth rate of establishments in other MSA markets in the state, each interacted with indicator variables for deregulating states and post-deregulation years. Coefficients for market level covariates --growth rates of deposits, personal income, 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 VII

Growth Rate of Employment/Payroll After Within & Across State Branching Deregulation

	Dependent Variable - Growth Rate of Employment and Payroll			
	Treatment - Within and Across State Deregulation			
	MSA		NonMSA	
	Empl (1)	Payroll (2)	Empl (3)	Payroll (4)
GrDepsOther	-0.0025	0.0087	0.0033	0.0243***
	(0.0074)	(0.0153)	(0.0078)	(0.0085)
GrDepsOther*Within	-0.0336	-0.0461	-0.0484*	-0.0960***
	(0.0230)	(0.0414)	(0.0284)	(0.0340)
GrDepsOther*Within*Post	0.0431*	0.0166	0.0315	0.0917*
	(0.0256)	(0.0370)	(0.0358)	(0.0465)
Gr(Empl/Pay)Other	0.1137**	0.0223	0.0391	0.0406
	(0.0491)	(0.0707)	(0.0541)	(0.0681)
Gr(Empl/Pay)Other*Within	-0.0908*	-0.006	-0.0107	-0.0107
	(0.0469)	(0.0640)	(0.0523)	(0.0670)
Gr(Empl/Pay)Other*Within*Post	-0.1050**	-0.0225	-0.1182*	-0.0837
	(0.0518)	(0.0672)	(0.0588)	(0.0651)
N	6,945	6,941	41,073	41,070
R-sq	0.56	0.59	0.19	0.22

Notes: The table presents an OLS regression of the growth rate of employment and payroll in MSA markets on the growth rate of market level deposits, the average growth rate of deposits in other MSA markets in the state, and the average growth rate of employment and payroll in other MSA markets in the state, each interacted with indicator variables for deregulating states and post-deregulation years. Coefficients for market level covariates--growth rates of deposits, personal income, 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%

VII Figures

Figure 1

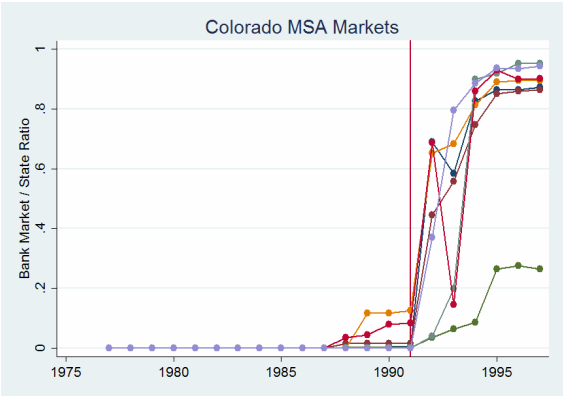


Figure 2

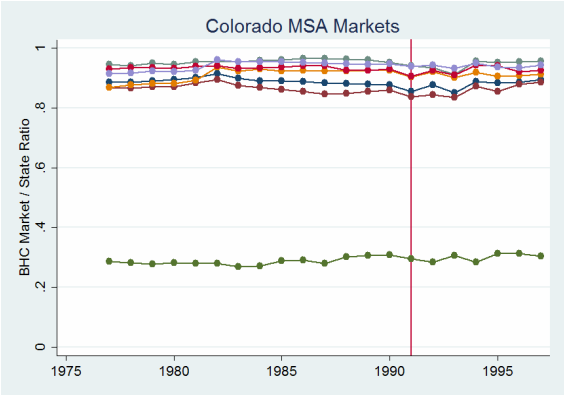


Figure 3

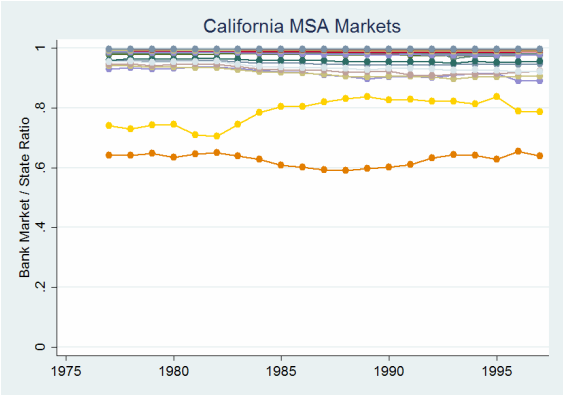


Figure 4

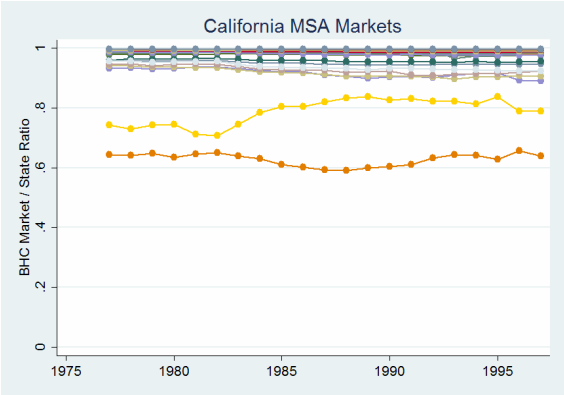


Figure 5

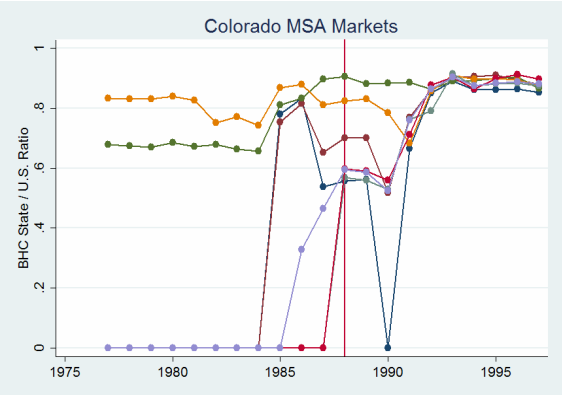


Figure 6

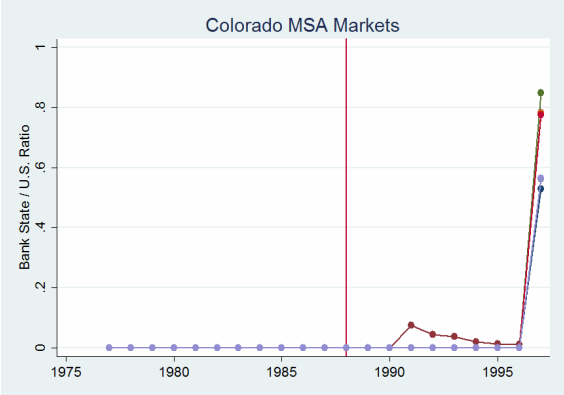


Figure 7

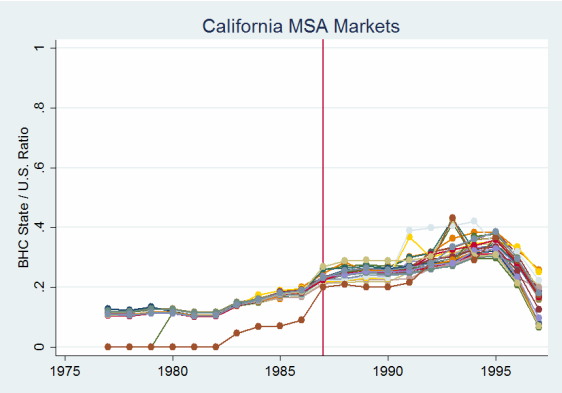
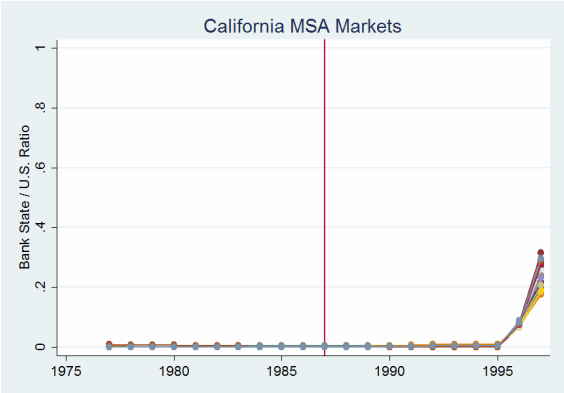


Figure 8



References

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

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

[3] Becker, Bo, Geographical Segmentation of U.S. Capital Markets, *Journal of Financial Economics* 85(1) (2007), 161-178.

[4] 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.

[5] 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.

[6] Berger, A.N. and Gregory F. Udell, Small Business Credit Availability and Relationship Lending: The Importance of Bank Organizational Structure, *Economic Journal* 1123 (2002), F32-F53.

[7] Bernanke, Ben and Alan S. Blinder, Credit, Money, and Aggregate Demand, *American Economic Review* 78(2) (1988), 435-439.

[8] Bertrand, Marianne, Antoinette Schoar, and David Thesmar, Banking Deregulation and Industry Structure: Evidence from the French Banking Reforms of 1985, *Journal of Finance* 62(2) (2007), 597-628.

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

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

[11] Blanchard, Olivier, and Lawrence F. Katz, Regional Evolutions, *Brooking Papers on Economic Activity*, No. 1 (1992), 1–74.

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

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

[14] 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).

[15] Campello, Murillo, Internal Capital Markets in Financial Conglomerates: Evidence from Small Bank Responses to Monetary Policy, *Journal of Finance* 57 (2002), 2773-2805.

[16] 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.

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

[18] 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).

[19] 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.

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

[21] Acharya, Viral, Jean Imbs, and Jason Sturgess, Finance and Efficiency: Do Bank Branchin Regulations Matter?, *Review of Finance* (forthcoming)

[22] Holmstrom, Bengt, and Jean Tirole, Financial Intermediation, Loanable Funds, and the Real Sector, *Quarterly Journal of Economics* CXII (1997), 663–691.

[23] 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.

[24] Huang, Rocco, The Real Effect of Bank Branching Deregulation: Comparing Contiguous Counties Across U.S. State Borders, *Journal of Financial Economics* 87(3) (2008), 678-705.

[25] 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.

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

[27] Jayaratne, 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.

[28] Jayaratne, Jith and Donald Morgan, Financial Market Frictions and Deposit Constraints at Banks, *Journal of Money, Credit, and Banking* 32 (2000), 74-92.

[29] Kashyap, Anil K. and Jeremy Stein, What Do a Million Observations on Banks Say About the Transmission of Monetary Policy?, *American Economic Review* 90(3) (2000), 407-428.

[30] Kerr, William R. and Ramana Nanda, Democratizing Entry: Banking Deregulations, Financing Constraints, and Entrepreneurship, *Journal of Financial Economics* 94(1), (2009), 124-49.

[31] Khwaja, Asim Ijaz and Atif Mian, Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market, *American Economic Review* 98(4) (2008), 1413-42.

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

[33] 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.

[34] 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.

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

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

[37] Malmendier, Ulrike, Law and Finance 'at the Origin', *Journal of Economic Literature* 47(4) (2009), 1076-1108.

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

[39] Peek, Joe and Eric Rosengreen, The International Transmission of Financial Shocks: The Case of Japan, *American Economic Review* 87 (1997), 495-505.

[40] Peek, Joe and Eric Rosengreen, Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States, *American Economic Review* 90 (2000), 30-45.

[41] Paravisini, Daniel, Local Bank Financial Constraints and Firm Access to External Finance, *Journal of Finance* 63(5) (2008), 2161-93.

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

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

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

[45] Rice, Tara, and Philip E. Strahan, Does Credit Competition Affect Small-Firm Finance?, *Journal of Finance* 65(3) (2010), 861-889.

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