Bank Integration and Financial Constraints: Evidence from U.S. Firms*

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Abstract

This paper uses data on publicly-traded firms in the U.S. to analyze the effect of interstate bank integration on the financial constraints borrowers face. A firm-level investment equation is estimated in order to test if bank integration reduces the sensitivity of capital expenditures to the level of internal funds. The staggered deregulation of cross-state bank acquisitions that took place in the U.S. between 1978 and 1994 helps estimate the model. Integration decreases financing constraints on average, with small firms benefiting the most. These findings are robust to controlling for bank concentration and to the use of different estimation techniques.

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1. Introduction

This paper presents the first firm-level analysis on the effect of interstate bank integration on firm financial constraints. Between 1976 and 1994, the share of deposits held by Multi-State Banks (MSBs) in the U.S. rose from 12% to 69%. Existing literature suggests that this increase in bank integration through cross-state acquisitions is associated with more credit availability, enhanced bank efficiency, and less state-level business cycle volatility.[1] However, these studies do not consider the impact of bank integration on individual firms. This paper fills that void by asking two questions: did bank integration reduce financing constraints that firms face? Was this effect different for small publicly-traded firms?

The methodology follows the well established literature on investment with financing constraints.[2] An Euler equation for investment is estimated using firm-level data on publicly-traded firms in the U.S. manufacturing sector for the period between 1976 and 1994. Since the decision to deregulate cross-state bank entry is exogenous to the firm, this paper takes advantage of the staggered banking liberalization that took place across states to estimate the impact of state laws on borrower financing constraints.

The results indicate that bank integration reduces financing constraints for publicly-traded firms. The sensitivity of investment to internal funds becomes weaker after interstate agreements permitting cross-border acquisitions are passed. Using the market share of MSBs in local markets as the integration measure reinforces these results.

The relationships described in this paper are robust to a variety of factors including the level of bank concentration and the structure of branching restrictions in place within the state. The main results are also robust to varying the sample of firms included in the

[1] For a summary of these results see Strahan (2003).

[2] This work began with Fazzari, Hubbard and Peterson (1988). For a review of the literature see Hubbard (1998) and Schiantarelli (1996). Recently, this approach to measure financial constraints has been criticized on theoretical grounds by Alti (2003), Cooper and Ejarque (2001), Gomes (2001), Kaplan and Zingales (1997, 2000), and Moyen (1994). Its empirical findings are also questioned by Cleary (1999), Erickson and Whited (2000), and Cleary et al. (2005). This paper will follow the approach described in Gilchrist and Himmelberg (1998), and applied by Love (2003), Laeven (2003), and Forbes (2003), amongst others.

empirical analysis depending on their data availability, and are not sensitive to the exclusion of major states (*e.g.*, California, New York, and Texas). The conclusions are also unaffected by the use of different proxies for internal funds in the Euler equation estimation, as well as the inclusion of additional controls like the firms' leverage.

Bank integration has different effects on different size firms. Large publicly-traded firms can access national securities markets and rely less on bank debt. On the other hand, smaller firms use bank debt more frequently to mitigate information asymmetries between lenders and borrowers. This preference for bank debt in smaller firms motivates the focus on this particular sample of publicly-traded borrowers.[3] This study finds that bank integration produces a significant decrease in financing constraints for small publicly-traded firms. Furthermore, a difference-in-difference analysis shows that permitting interstate banking cuts the interest rate these firms pay on lines of credit by about 50 basis points.

Interstate banking deregulation may alter the level of bank concentration within a state.[4] This change in concentration may relax firms' financing constraints. The correlation between cross-state acquisitions and market structure makes it important to control for bank concentration to separate its impact from that of bank entry deregulation. This paper uses the Herfindahl-Hirshman Index (HHI) of bank deposits by state as a measure of concentration. Incorporating this factor does not change the principal finding of a decrease in the internal fund-investment sensitivity after interstate acquisitions are allowed. Moreover, firms are less financially constrained in states with higher, although not "extremely high", levels of bank concentration.[5]

Besides interstate deregulation, some states also lifted restrictions on intrastate branching through mergers and acquisitions (M&As) between 1976 and 1994. Allowing

[3] Petersen and Rajan (1994) and Berger and Udell (1995) use a sample of mostly private firms in their study. About 80% of these firms have fewer than 50 employees. By contrast, in this paper small publicly-traded firms from the manufacturing sector have an average of 375 employees.
[4] Jayaratne and Strahan (1998) show a negative and significant relation between interstate integration and bank concentration for U.S. states.
[5] HHI levels above 1800 are defined as "extremely high".

for the expansion of banks within the states may have changed external financing conditions for firms. To separate the impact of the two policies, the effect of intrastate deregulation on firm financial constraints is explicitly measured. Interstate deregulation reduces the sensitivity between internal funds and investment even after controlling for intrastate deregulation. This result is robust to the exclusion of those states where both types of deregulation took place within one year.

Lastly, following the literature on investment with financial constraints, the sample of firms is divided using *a priori* measures of the financing frictions they face.[6] The point is to test if interstate deregulation decreases the sensitivity of investment to internal funds for those firms *a priori* classified as constrained. Results show that firms with a low dividend payout and no commercial paper or bond rating decrease their sensitivity to internal funds after deregulation. This finding adds another dimension to the study of investment with financing constraints. Besides testing the sensitivity of investment to internal funds for *a priori* classified firms, this paper shows the importance of measuring the effects of exogenous changes to the cost of external finance on financial constraints.

The U.S. is a good place to study the effect of bank integration for three reasons. First, bank regulation before the 1970s created 50 isolated banking systems with idiosyncratic characteristics. These differences were translated into varying levels of firms' access to credit before deregulation. Second, when states changed their regulatory restrictions they did so at different points in time. Because the U.S. experienced other regulatory changes that affected all states simultaneously, the staggered process of interstate entry deregulation permits identification.[7] Finally, although U.S. states have their own laws and differ in their economic structure, these differences are minor compared to differences between countries. Hence it is simpler to control for state specific effects.

[6] Almeida et al. (2004) and Cleary (2005) describe some of the most commonly used *a priori* measures.
[7] One of those changes was the removal of regulation Q in 1986.

The rest of the paper is organized as follows. Section 2 reviews the literature on bank integration and its real and financial effects. Section 3 provides an overview of the history of banking deregulation in the U.S. Section 4 describes the theoretical framework and outlines the empirical model and estimation methodology. Section 5 describes the data and Section 6 presents the main results. Section 7 uses a difference-in-difference analysis to study the effects of integration on firms' financial variables. Finally, Section 8 concludes.

2. Literature Review

Three types of studies have analyzed the effect of bank integration. The first category deals with the relation between bank deregulation and real variables at the state level. Strahan (2003) finds that interstate deregulation is associated with an increase in incorporations by state and a reduction in the link between state growth and local bank performance. In a study on income insurance, Demyanyk *et al.* (2005) find that deregulation, measured as the combination of intra and interstate deregulation, decreases the correlation between personal income and state-specific shocks to output. Their result is stronger for proprietor income than wage income. The authors explain this effect by the closer relationship between banks and small businesses. This outcome is connected to Morgan et al.'s (2004) finding that geographical bank integration reduces employment volatility within states. This change results from a decline in the impact of bank capital shocks on state activity.[8]

These studies raise two concerns. First, their findings are subject to the criticism of spurious causality. Interstate deregulation may be the product of changing economic conditions or pressure by interest groups within the state and thus endogenous at the state-level.[9] Second, almost simultaneous deregulation of intra and interstate banking in some states makes it difficult to differentiate the effect of each policy on state-level variables.

[8] Morgan and Strahan (2003) find that this result is not replicated using a cross-country sample.
[9] For a discussion of the political economy of deregulation see Kroszner and Strahan (1999) or Calomiris and Ramirez (2002).

The second strand of literature analyzes the impact of deregulation on banks. Jayaratne and Strahan (1998) study the effect of bank entry deregulation on bank performance. They find substantial reductions in loan losses and operating costs after cross-state acquisitions are permitted. Hubbard and Palia (1995) find that turnover and the sensitivity of pay to performance for bank senior executives increase after states allow interstate banking. This is interpreted as a tightening in management discipline due to an increased risk of takeovers. Stiroh and Strahan (2003) find a stronger link between performance and market share after deregulation. This is attributed to competitive reallocation of assets to better performers. Finally, Dick (2005) analyzes the period following the Riegle-Neal Act and shows an increase in bank quality. A significant portion of this change in service quality is traced to the implementation of national branching. These findings point to more bank efficiency after cross-state deregulation.

The third set of studies analyzes the effect of financial M&As on bank lending. Berger et al. (2000) find that M&As in local markets have little effect on small business lending. Bank age is a more relevant factor in explaining credit to small firms. On the other hand, Berger and Udell (1996) show that an increase in bank size through consolidation produces a decrease in bank lending to small businesses. Peek and Rosengren (1998) expand on this idea and find that acquired banks adopt the lending patterns of the acquirer after the merger.[10] If the acquiring bank has a bias for large-firm lending, the target will adopt the same strategy. Karceski et al. (2005) use a sample of Norwegian publicly-traded firms to study the effect of bank M&As on their borrowers' stock prices. They find that small borrowers are the most affected after mergers and are also the least likely to switch to other banks for their credit requirements.

There are two issues that differentiate the current paper from this last set of studies. First, the M&A literature does not differentiate between cross-state and in-market acquisitions. This makes it difficult to draw conclusions on the effect of geographical bank integration at the national level. Second, most of the findings are drawn from bank

[10] Hadlock *et al.* (1999) find that acquisitions usually result in the replacement of the target's management.

lending data. Therefore, they do not take into account the firm's credit requirements. This paper addresses this concern by estimating the investment model on individual firms.

The literature reviewed in this section shows that bank deregulation has a significant effect on the real economy. Although, the evidence on M&As suggests that bank mergers reduce small business lending, these findings are not differentiated by type of acquisition (inter as opposed to intrastate). This paper will complement and extend the existing literature by using firm-level data to analyze the effect of interstate bank deregulation.

3. Recent History of Banking Deregulation in the U.S.

Starting with the McFadden Act of 1927, the U.S. endured a period of restrictions on branching and interstate acquisitions that lasted until the last decades of the twentieth century. The first restrictions lifted were those that limited intrastate branching. By 1974, 13 states had already allowed unrestricted branching within their borders. In the next two decades, 35 more states eliminated partially or all restrictions on intrastate branching. Differences in states' willingness to allow branch networks sustained the development of very diverse bank systems across states, where some of them allowed only unit banking while other states permitted statewide branching.[11]

The Douglas Amendment to the Bank Holding Company act of 1956 prohibited Bank Holding Companies (BHCs) from establishing or purchasing bank subsidiaries across state lines unless the state of the target bank authorized the transaction. These restrictions remained until Maine passed a law allowing out-of-state BHCs to purchase local banks if the "home" state of the BHC reciprocated. This didn't happen until 1982 when Alaska and New York passed similar laws. The same year, as part of the Garn-St Germain Act, federal legislators amended the Bank Holding Company Act to allow failed banks to be acquired by any BHC, regardless of origin and state laws. This regulatory

[11] For a review of the evolution of the U.S. banking industry see Berger *et al.* (1995).

change, coupled with a series of bank and thrift failures during the eighties, triggered a wave of interstate agreements that effectively permitted banking at the national level.

Before 1994, 49 states and the District of Columbia had deregulated their banking markets allowing out-of-state entry. Typically, acquisitions by out-of-state BHCs were limited to banks from same-region states although some states were open to nationwide entry. Interstate branching was permitted nationwide with the Riegle-Neal Interstate Banking and Branching Efficiency Act, which became effective in June 1997. Some states took advantage of a clause in the Act and opted out at an earlier date.[12]

4. Testing Framework and Methodology

4.1. Theoretical Model

This section describes a model of investment with financial frictions. It closely follows Laeven (2003) and Love (2003), which in turn build on Gilchrist and Himmelberg (1998).[13]

Shareholders (managers) are assumed to maximize the present value of the firm, which is the expected discounted value of dividends, subject to capital accumulation and external financing constraints. The optimization problem is:[14]

$$V_t\left(K_t, B_t, \xi_t\right) = \max_{\{I_{t+s},\, B_{t+s+1}\}_{s=0}^{\infty}} D_t + E_t\left[\sum_{s=1}^{\infty} \beta_{t,t+s} D_{t+s}\right] \tag{1}$$

subject to

$$D_t = \Pi\left(K_t, \xi_t\right) - C\left(I_t, K_t\right) - I_t + B_{t+1} - \left(1+r_t\right)\left(1+\eta\left(B_t, K_t, \xi_t\right)\right)B_t \tag{2}$$

$$K_{t+1} = \left(1-\delta\right)K_t + I_t \tag{3}$$

[12] Montana and Texas opted out.
[13] For a different derivation of the model see Forbes (2003).
[14] The price of investment goods is normalized to one. In the empirical specification it is replaced by fixed and time effects.

$$D_t \geq 0 \tag{4}$$

Where variables are defined as: D_t is the dividend paid to shareholders over period t and is given by (2); K_t is the capital stock at the beginning of period t in the capital accumulation equation (3), with I_t representing investment expenditure and δ the depreciation rate; E_t [.] is the expectation operator conditional on time t information; $\beta_{t,t+s}$ is a discount factor, which discounts period $t+s$ to period t. $\Pi\left(K_t, \xi_t\right)$ is the restricted profit function (already maximized with respect to variable costs), where ξ_t is a productivity shock. B_t is net financial liabilities and the convex adjustment cost function of investment is given by $C\left(I_t, K_t\right)$.[15]

Financial frictions are introduced in the model by assuming that debt is the marginal source of finance and that risk-neutral debt holders require an external finance premium given by $\eta_t = \eta\left(B_t, K_t, \xi_t\right)$. This premium depends on the set of state variables and is an increasing function of B_t, due to agency costs. The gross required rate of return on debt is $\left(1+r_t\right)\left(1+\eta\left(B_t, K_t, \xi_t\right)\right)$, where r_t is the risk-free rate of return. Equation (4), the non-negativity constraint on dividends, assures that the marginal source of finance is debt.[16] The current value multiplier on this constraint, denoted by λ_t, can be interpreted as the shadow cost of external funds, or a premium on outside equity finance. Then the Euler equation for investment derived from the above maximization problem is:[17]

$$1+\frac{\partial C\left(I_t, K_t\right)}{\partial I_t} = \beta_{t,t+1} E_t\left[\frac{1+\lambda_{t+1}}{1+\lambda_t}\left\{\frac{\partial D_{t+1}}{\partial K_{t+1}} + \left(1-\delta\right)\left(1+\frac{\partial C\left(I_{t+1}, K_{t+1}\right)}{\partial I_{t+1}}\right)\right\}\right] \tag{5}$$

[15] The time to build and install a unit of capital is one period.

[16] The rational for costly external equity financing is based on informational asymmetries as described by Myers and Majluf (1984), or incentive problems as in Jensen and Meckling (1976). Whited (1992), Hubbard, Kashyap and Whited (1995), and Jaramillo, Schiantarelli and Weiss (1996) introduce another way to include financial frictions by limiting the amount of debt that the firm can raise at any point in time.

[17] This paper follows Laeven (2003) and Gilchrist and Himmelberg (1998) and ignores the marginal reduction of *MPK* due to financing cost in the empirical specification, since this is a second-order effect relative to $\left(\partial\Pi/\partial K\right)_{t+1}$.

Equation (5) can be interpreted as the marginal cost of investing at time *t* being equal to the discounted marginal cost of investing one period later. The focus of this analysis will center on $1+\lambda_{t+1}/1+\lambda_t$, which represents the relative shadow cost of external finance in periods *t* and *t+1*. In perfect capital markets, where $\lambda_{t+1}=\lambda_t=0$ and $\eta_t=0$ for all *t*, the firm is never constrained. On the other hand, if $\lambda_t=0$ and $\lambda_{t+1}>0$, which implies that the firm is financially constrained at time *t+1* but not at time *t*, then $1+\lambda_{t+1}/1+\lambda_t$ will act as an additional discount factor. This will increase the cost of postponing investment by one period, inducing the firm to invest at time *t*.

The first order conditions for debt are described by:

$$E_t\left[\left(\frac{1+\lambda_{t+1}}{1+\lambda_t}\right)\left(1+\eta_{t+1}+\frac{\partial\eta_{t+1}}{\partial B_{t+1}}B_{t+1}\right)\right]=1 \qquad (6)$$

Since this first-order condition is not related to the Euler equation for investment, this paper follows Himmelberg and Gilchrist (1998) and Laeven (2003) and focus on the investment decision leaving the choice of debt implicit.

MPK_t is defined as the marginal profit function net of adjustment costs and financing costs. For simplicity, assume that $\beta_{t,t+s}$ is equal to β^s for all s, and firms. Then, the Euler equation for investment can be expressed as:

$$1+\frac{\partial C\left(I_t,K_t\right)}{\partial I_t}=E_t\left[\sum_{s=1}^{\infty}\beta^s\left(1-\delta\right)^{s-1}\left(\prod_{k=1}^{s}\left(\frac{1+\lambda_{t+k}}{1+\lambda_{t+k-1}}\right)\right)MPK_{t+s}\right] \qquad (7)$$

To arrive at the empirical model, this equation is parameterized and transformed in the next subsection.

4.2. Empirical Framework

As it can be seen in (7), the stochastic discount factor $1+\lambda_{t+1}/1+\lambda_t$ induced by financial constraints enters in a multiplicative form. In empirical work it is often easier to interpret and estimate financing constraints when they are additive. Therefore, the product of the stochastic and deterministic ($\beta^s(1-\delta)^{s-1}$) discount factors in (7) is linearized using a first-order approximation around the means to get:[18]

$$1+\frac{\partial C(I_t,K_t)}{\partial I_t}=\Psi+E_t\left[\sum_{s=1}^{\infty}\beta^s(1-\delta)^{s-1}MPK_{t+s}\right]+\varphi E_t\left[\sum_{s=1}^{\infty}\beta^s(1-\delta)^{s-1}\Phi_{t,t+s}\right] \quad (8)$$

Where $\Phi_{t,t+s}$ represents the stochastic discount factor and Ψ includes all constant terms.

In order to obtain a closed-form solution it is necessary to specify the adjustment cost function. As it is standard in the literature, linear homogeneity in investment and capital is assumed. Following Love (2003), the functional form used is:

$$C(I_{it},K_{it})=\frac{\alpha}{2}\left(\frac{I_{it}}{K_{it}}-g\frac{I_{it-1}}{K_{it-1}}-\nu_i\right)^2K_{it} \quad (9)$$

It includes the lagged investment to capital ratio to capture strong persistence observed in the data. This can be explained by investment arrangements made by firms with costly cancellation costs. ν_i is a firm specific effect and *i* indexes firms.[19]

MPK_{it} is parameterized using a sales-based measure derived from the profit maximization problem assuming a Cobb-Douglas production function. It can be expressed as:[20]

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[18] It is assumed that $E(\Phi_{t,t+s})\simeq 1$ and $E(MPK_{t+s})\simeq\varphi$.

[19] Marginal adjustment cost is given by $\frac{\partial C(I_{it},K_{it})}{\partial I_{it}}=\alpha\left(\frac{I_{it}}{K_{it}}-g\frac{I_{it-1}}{K_{it-1}}-\nu_i\right)$.

[20] θ can be expressed as α_k/μ, where α_k is the capital share in the production function and μ is a markup. In the empirical estimations the coefficient of the sales to capital ratio is constant across firms. Measurement error due to this assumption is ameliorated by the use of fixed-effects.

$$MPK_{it} = \theta_i \frac{S_{it}}{K_{it}} \tag{10}$$

As a sensitivity test *MPK* will also be proxied by using a measure of Tobin's q.

At the center of this estimation is the definition of the stochastic discount factor representing financing constraints $\Phi_{t,t+s}$. The previous literature has relied on *ad hoc* parameterizations using observed characteristics of firm's financial health to identify the effect of financing constraints on investment decisions. This study follows Love (2003) and uses the "stock of liquid assets", namely the value of cash and equivalents, and divide it by the capital stock to parameterize $\Phi_{i;t,t+s}$ as:[21]

$$\Phi_{i;t,t+s} = \phi_{0i} + \sum_{k=1}^{s} \phi \left(\frac{Cash}{K} \right)_{it+k} \tag{11}$$

Cash is measured at the beginning of period *t* and ϕ_{0i} is a firm specific effect.

The main hypothesis of this paper is that financial integration reduces financing constraints. To test this, ϕ is allowed to vary with the states' (*j*) measure of financial integration. So, $\Phi_{i;t,t+s}$ is defined as:

$$\Phi_{i;t,t+s} = \phi_{0i} + \sum_{k=1}^{s} (\phi_1 + \phi_2 Intg) \left(\frac{Cash}{K} \right)_{it+k} \tag{12}$$

Then, (12) is replaced in (8) to obtain:

[21] Empirical evidence on the relation between cash can be found in Opler et al. (1999). Calomiris, Himmelberg and Wachtel (1995) also find that firms with less cost of external finance maintain lower levels of working capital. Cash flow is also used to proxy for financial constraints, but the problem with this measure is that it is closely related to operating profits and thus *MPK*. It may capture investment opportunities instead of net worth or the availability of internal funds.

$$1+\frac{\partial C\left(I_{it},K_{it}\right)}{\partial I_{it}}=\mathrm{Z}+E_t\left[\sum_{s=1}^{\infty}\beta^s\left(1-\delta\right)^{s-1}MPK_{it+s}\right]+\phi_1\varphi E_t\left[\sum_{s=1}^{\infty}\sum_{k=1}^{s}\beta^s\left(1-\delta\right)^{s-1}\left(\frac{Cash}{K}\right)_{it+k}\right] \quad (13)$$
$$+\phi_2\varphi E_t\left[\sum_{s=1}^{\infty}\sum_{k=1}^{s}\beta^s\left(1-\delta\right)^{s-1}\left(\frac{Cash}{K}*Intg\right)_{it+k}\right]$$

Following Laeven (2003), MPK_{it}, $\left(Cash/K\right)_{it}$ and $\left(\left(Cash/K\right)*Intg\right)_{it}$ are assumed to be represented by a vector autoregressive process of order one. This makes it possible to express (13) as a linear function of the current value of these variables. This simplification added to the assumption of rational expectations and equations (9), (10) and (13), define the central estimating equation as:

$$\left(\frac{I}{K}\right)_{it}=\alpha_0+\alpha_1\left(\frac{I}{K}\right)_{it-1}+\alpha_2\left(\frac{S}{K}\right)_{it}+\alpha_3\left(\frac{Cash}{K}\right)_{it}+\alpha_4\left(\frac{Cash}{K}*Intg\right)_{it}+f_i+h_{jt}+\varepsilon_{it} \quad (14)$$

Where f_i are fixed effects and h_{jt} denote state-time dummies capturing aggregate shocks differentiated by state. The error term ε_{it} is orthogonal to any information available at the time when the investment decision is made.

The main hypothesis on the impact of financial integration on firm financing constraints is tested using (14). The test is formally stated as:

$$H_0:\alpha_3\geq 0\ and\ \alpha_4<0 \quad (15)$$

It implies that for some firms, financial constraints decreased after interstate agreements where passed or as financial integration increased.

4.3. Estimation Methodology

There are two issues that need to be addressed to be able to estimate the empirical model in equation (14). First, fixed effects (f_i,h_{jt}) are correlated with regressors due to the

presence of lags of the dependent variable in the estimating equations. This requires panel data techniques to obtain consistent estimates of the coefficients. Second, some of the explanatory variables in (14) could be simultaneously determined with the dependent variable or be subject to reverse causality. Therefore, a GMM procedure implemented as instrumental variables is used to control for this problem.

In order to solve the first issue, unobservable fixed effects are eliminated by transforming all variables using a forward-mean differencing procedure, also referred to as the Helmert's procedure.[22] It removes only the forward mean, which has the advantage of preserving orthogonality between transformed errors and untransformed original variables. If the error term in (14) is serially uncorrelated, lagged values of the untransformed dependent and explanatory variables will be valid instruments in the transformed model. To remove state-time dummies, h_{jt}, all variables are differenced, including instruments, by extracting the mean for each state and time period.

The second issue is addressed by estimating (14) by GMM using an optimal weighting matrix. As it was discussed in the previous section ε_{it} is orthogonal to any information available when the investment decision is made. Firms are assumed to take that decision for year *t* at the beginning of the period. Taking into account that firms report their information at the end of the year, all information available to managers will be dated *t-1*. As a result, the orthogonality conditions are given by $E\left(X_{it}'\varepsilon_{is}\right)=0$ for all *s>t*, where *X* is the vector of instruments.[23] Combining this with the properties of the forward-mean differencing procedure discussed above, this estimator is implemented using *t-1* and *t-2* lags of the untransformed variables as instruments. These are all the variables in the regressions plus industry dummies at the 2 digit SIC level.

To test the validity of these instruments the J-Statistic developed by Hansen (1982) is used. Under the null hypothesis, it is distributed as χ^2 with degrees of freedom equal to

[22] Initially proposed by Arellano and Bover (1995), it was used by Bond and Meghir (1994), Gilchrist and Himmelberg (1998) and Love (2003).
[23] This is equivalent to the assumption of predetermined regressors instead of strictly exogenous.

the number of overidentifying restrictions. Finally, all regressions are estimated using heteroskedasticity robust standard errors clustered by state.

5. Data

5.1. Bank Data

Bank integration during the seventies and eighties is measured using four different proxies. The first measure is an indicator variable for whether or not a state passed an interstate banking agreement with other states. Table 1 reports the dates when these agreements were passed into law for each state.[24] Maine passed the first interstate agreement in 1978 followed by Alaska and New York in 1982. On aggregate, 18 agreements were approved before 1985, 26 between 1986 and 1990 and 4 more before the Riegle-Neal Interstate Banking and Branching Act passed in 1994.[25]

In addition to the indicator variable, there are three measures computed using commercial bank balance sheet items. These integration measures are the share of assets, commercial and industrial loans (C&I) and deposits, controlled by Multi-State Banks (MSBs) in each state.[26] A MSB is defined as a bank with holdings in more than one state. For the period between 1976 and 1994, financial data is taken from the Reports of Condition and Income (Call Reports) compiled by the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency, and the Federal Reserve System. After the Riegle-Neal Act passed in 1994 banks were allowed to consolidate their operations within a single bank. This makes the integration measure in terms of assets and C&I loans incalculable after this year. Between 1994 and 2002 information on deposits is compiled from the Summary of Deposits (SOD) database produced by the FDIC. It reports deposits by branch, its location and their parent institution. This dataset helps extend the share of deposits series until 2002.

[24] The source for these dates is Kroszner and Strahan (1999).
[25] Delaware and South Dakota are dropped from the sample due to the significant presence of credit card companies in these states since the eighties. Hawaii didn't deregulate before the Riegle-Neal act was passed in 1994. The District of Columbia is included in the sample.
[26] A similar measure is proposed by Morgan and Strahan (2003).

Figure 1 shows the evolution of the three continuous integration measures during the last three decades. Bank integration as measured by these ratios moved closely together and stayed under 10% before 1982. From this year onwards, there was a considerable increase in the share of assets, C&I loans and deposits held by MSBs, reaching the 60% mark in 1994. This pattern is consistent with the passage of interstate agreements beginning in 1982.[27]

Table 1 reports bank integration measured as the average share of deposits in MSBs by state before and after 1982. Most of the states have very small MSB penetration prior to this year. Some exceptions are found in western and mid-western states, explained by grandfathered agreements prior to the passage of the Bank Holding Company Act of 1956, which explicitly prohibited interstate banking. The mean of this integration measure increased from 13% before 1982 to 50% after deregulation started in 1982.

To control for bank concentration in the main estimations, the Herfindahl-Hirschman Index (HHI) for deposits is computed at the state level between 1976 and 2002.[28] Although not a perfect measure, it captures the change in market structure in the banking sector. Figure 2 shows a slight increase in concentration after the first interstate agreements were passed in 1982. Then it stabilized around a median of 1000; by the Department of Justice (DOJ) guidelines, this would be considered as "moderately concentrated".

[27]As the graph shows, the average ratio of deposits in MSBs computed with the Call Report and SOD datasets are close to each other for 1994. Additionally, there aren't considerable jumps for each state series either. Therefore, some of the estimation will include an integration measure using the share of deposits for the 1976 to 2002 period.

[28] As with the integration measures Call Report data is used between 1976 and 1994 and the SOD dataset for the period between 1994 and 2002. HHI is constructed as the sum of squared market shares for deposits in all banks by geographical market. It could range from 10000 for highly concentrated markets to 0 for very competitive markets. Metropolitan Statistical Areas (MSAs) and counties are usually used as the definition for a market. In this analysis the state will be defined as the market, due to this study's interest in analyzing bank integration at this level. For commonly used concentration measures see Amel and Starr-McCluer (2002).

In those estimations that include concentration, two dummy variables that take into account the level of concentration by state are generated. The first indicator variable is equal to one if HHI surpasses the 1800 threshold, which by the DOJ standards will define a market as "highly concentrated". A second dummy is set to one when HHI is above the median (1016) for the complete period between 1976 and 2002.

5.2. Firm Data

Firm level data is compiled from the Compustat database, which contains Balance Sheet and Income Statements for publicly-traded firms.[29] The sample consists of U.S. manufacturing firms (SIC codes between 2000 and 3999) between 1976 and 1994.[30] The firm's "home" state is determined by the location of its corporate headquarters or home office. The advantage of using this dataset is that it covers firms before and after interstate banking deregulation took place. Therefore, it allows for the measurement of the change in financial constraints due to interstate deregulation. There is one limitation with this dataset; it excludes small and medium privately-held firms, which are commonly studied in this context because of their presumed higher degree of informational asymmetry. The analysis in this paper can only be interpreted as evidence of how bank integration affects different-sized publicly-traded firms.

All firm-year observations with complete data on the required variables are used in the sample. A minimum coverage of four years of data is set for each firm due to the loss of observations implicit in the estimation procedure. Furthermore, a firm is required to have at least two years of data before and after an interstate agreement is signed by its home state.[31] However, it is necessary to delete more firms due to possible outliers in the sample explained by acquisitions, revaluation of assets, or problems with the data. The result of this process is an unbalanced panel of firms for the period between 1976 and 1994. Details on sample selection and outlier rules are given in Appendix 1.

[29] Compustat North America is a database of U.S. and Canadian firms produced by Standard and Poor's investment services and includes fundamental and market information on more than 24,000 active and inactive publicly-held companies.
[30] Some estimations use an extended sample including observations between 1976 and 2002.
[31] Allowing for longer periods before and after the agreement does not change the main results. Regressions without imposing this restriction also give similar outcomes.

Table 2 reports the number of firms and observations used in these estimations by state. A total of 1612 firms and 24298 firm-year observations are included in the sample with average data coverage per firm of 15 years. Companies are unevenly distributed across states, with California, New York and Texas accounting for 28% of the sample. This factor will be further explored in the sensitivity analysis in Section 6.5.

From this firm-level dataset the necessary variables to estimate equation (14) are computed. As discussed in section 4.2., investment is assumed to be determined at the beginning of period *t*. Since accounting data are stated at the end of each period *t*, end-of-period *t-1* data on sales, cash stock, depreciation and capital are used to construct variables at the beginning-of-period *t*.[32] These estimations also test the effect of bank integration on financing constraints for firms at different scales. Firm size is measured by assets at the beginning-of-period in 1995 U.S. dollars.[33] Other variables are defined in Appendix 2.

Table 3 presents descriptive statistics of the key variables for firms included in the sample. Panel A displays firm size measured by the real value of assets. The median firm has real assets of 142 million (1995 US dollars) with a maximum value in the bottom quartile of 32 million. Firms in this sample are large relative to other surveys used to analyze the financial conditions of small firms.[34] Therefore, findings on size should be pondered by this characteristic of the sample and the fact that all firms are publicly-traded. Values for the main variables are comparable to those presented in Himmelberg and Gilchrist (1998) and Cleary et al. (2005). Panel B includes variables that are directly related to the financial activity of the firm. Panel C displays financial ratios that reflect the level of performance of those firms included in the sample.

[32] Capital stock is defined as Net Property, Plant and Equipment at the beginning-of-period *t*.
[33] I adjust for price changes using the U.S. GDP deflator from the IMF series L99BI..n..R..a..C111 with 1995 as the base year.
[34] Petersen and Rajan (1995) use the National Survey of Small Business Finances conducted between 1988 and 1989 in their study. The median firm size in their sample as measured by the book value of assets is $130,000 (current US dollars).

6. Results

The first sub-section test the main hypothesis using the investment model outlined in Section 4. Next, the effect of integration is shown for firms divided by size. In the following sections, estimations control for possible changes in concentration in the banking sector or the effect of intrastate deregulation. Finally, these results are checked to be robust to different samples and specifications.

6.1. Main Results

Table 4 shows the main results of the paper based on the model in equation (14). Column (1) uses the bank integration measure defined as a dummy variable equal to one after a state passes an interstate agreement law. The coefficients on sales and lagged investment have the predicted sign and are significant at the 1% level. The main coefficients are cash stock and its interaction with the bank integration variable. The sign of these two coefficients are in line with the hypothesis stated in (15) and are significant at the 1% level. This result implies that after interstate bank entry is permitted the cash-investment sensitivity is considerably reduced for this sample of publicly-traded firms.

In Columns (2), (3) and (4) integration is measured by using continuous variables representing the share of commercial and industrial loans (C&I), assets and deposits held by MSBs respectively. The result on bank integration using these variables is even stronger, signaling that MSB penetration changed the sensitivity of internal funds to investment for this sample of firms. Column (5) extends the sample coverage until 2002, including the post Riegle-Neal period. The coefficients on all variables remain almost unchanged and at the same levels of significance.

The reported Hansen test for over-identification is used to verify the validity of the model. In all specification the p-value reported indicates that it is impossible to reject the null hypothesis that the over-identifying restrictions are valid.

The methodology used in this study does not allow for any tests on the causes of this significant change in firm financing constraints after bank deregulation. As it stands,

these findings could be the result of an array of factors that have been explored in the literature. First, an improvement in monitoring and screening after integration produced by the entry of more technologically advanced institutions into local markets.[35] In addition, as MSBs expand geographically, they are able to diversify idiosyncratic credit risks. This allows them to increase the amount of business loans in their portfolio reducing the premium on external finance faced by local firms.[36] Finally, members of MSBs have access to internal resources available to all subsidiaries belonging to the same BHC. This internal capital market enables these banks to allocate capital within the institution and share risks with borrowers at a lower cost.[37] Any or a combination of these explanations may be driving these results. Future research should address these concerns.

6.2. Size

Table 5 shows the effect of interstate bank integration on financial constraints for firms producing at different scales. Size has been commonly used in the investment literature to proxy for the level of financing constraints.[38] Bank integration is expected to have different effects depending on the size of the firm. Large publicly-traded firms are able to access national public debt markets, limiting their reliance on bank debt to finance their investments. Therefore, any change in bank deregulation has a marginal effect on this set of businesses. On the other hand, smaller firms use bank debt more frequently to mitigate information asymmetries that arise in the relation between lenders and borrowers.[39] This preference for bank debt in smaller firms will likely magnify the effect of bank deregulation on this particular sub-sample of publicly-traded borrowers.

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[35] Jayaratne and Strahan (1998) found that interstate deregulation decreased average bank loan losses and operating cost by state. This could imply an improvement in technology which in turn decreases the costs intermediation. See also Berger *et al.* (2005).

[36] Demsetz and Strahan (1997) show that diversification in bigger Bank Holding Companies allows them to operate with more leverage and credit.

[37] Houston and James (1998) find that banks that belong to Bank Holding Companies are less cash flow constrained than those that are independent.

[38] See Devereux and Schiantarelli (1990), Oliner and Rudebusch (1992).

[39] Datta et al. (2000) find a positive relation between firm size and initial public bond offerings. Additionally, Petersen and Rajan (1994, 1995) find that small firms rely more on bank debt compared to larger firms. The model of corporate choice between public and private debt in the context of information asymmetries is covered by Diamond (1989, 1991) and Rajan (1992).

Table 5 expands the model estimated in Column (1) of Table 4 by dividing the sample by size according to assets, measured in 1995 U.S. dollars. Column (1) includes all firm-year observations with real assets below 100 million dollars and Column (2) displays the complement to this group. Columns (3) and (4) are estimated using firm-year observations with real assets below and above the median respectively. Results in these estimations show that integration reduces financing constraints for small publicly-traded firms. This is corroborated by the negative and significant coefficient on the interaction of bank integration and cash for the estimations in Columns (1) and (3).

These results suggest that small publicly-traded firms have better access to credit after interstate bank acquisitions are permitted. There is one particular distinction that has to be made. The nature of being publicly-traded and in the manufacturing sector, suggests that this sample of small firms has less asymmetric information problems compared to smaller private firms in other sectors were information is less transparent and reliable. Moreover, as Berger *et al.* (2005) find, large banks lend primarily to "larger firms with good accounting records", while smaller banks lend to "more difficult credits". Interstate entry deregulation allows large banks to enter local markets, producing an increase in loanable funds. The results on small publicly-traded firms show that an important part of this resources contributed to a decrease in financing constraints for this set of businesses.

Column (5) includes firms in the bottom tercile (small) and in (6) those with assets in the intermediate tercile (medium).[40] One relevant finding is that bank integration increases the cash-investment sensitivity for medium size firms. This result relates to the effect that Calomiris and Pornrojnangkool (2005) find as they study a merger of large regional banks. When the number of large local banks is limited, firms of medium size are not able to move their business to smaller local banks when MSBs enter the market.[41] This leaves the new banks with the potential of extracting monopolistic rents and affects the premium on external finance faced by this type of firms. Thus, the presence of MSB

[40] The bottom tercile is defined as firms with real assets of less than 61 million 1995 U.S. dollars. Medium firms are those with assets in between 61 million and 450 million in 1995 U.S. dollars.
[41] Due to diversification requirements, small banks can't lend to single borrowers.

may have a negative effect on medium firms due to highly concentrated markets but not for their entry *per se*. This result will be further explored in the next section.

6.3. Controlling for Bank Concentration

Tables 6A and 6B analyze if the bank integration effect is robust to controlling for bank concentration. The main concern is the existence of any correlation between the integration measures and bank concentration that would make the results a product of the change in market structure and not deregulation.

As it is shown in Figure 2, bank concentration measured by the Herfindahl-Hirschman Index (HHI) on deposits increased slightly after interstate deregulation started at the beginning of the eighties. Nonetheless it stayed at levels that the Department of Justice (DOJ) would consider as "moderately concentrated". Cetorelli (2001) reviews the literature on bank concentration and its impact on the economy, and finds that neither extreme competition nor monopoly is the most desirable state for the banking sector. In a study of privately held firms, Zarutskie (2004) finds that young firms are more likely to receive outside debt in less competitive banking markets. But firms in this environment are worse performers.[42] Taking into account the sample of older and larger firms used in the current study, one would expect higher concentration to have a bigger impact through rent extraction and thus, the level of financial constraints.

This study uses bank concentration at the state level instead of the more common methodology of computing concentration for each local market. This implicitly assumes that subsidiaries belonging to a BHC have the same skills, policies and procedures.[43] Therefore, their lending decisions are similar in the credit market within the state. In addition, the status of the firms in this sample as publicly-traded increases their geographical boundary beyond the local banking market. The assumption is that on

[42] Petersen and Rajan (1995) using a smaller sample find a similar result for young firms. Jayaratne and Strahan (1996), Black and Strahan (2002) and Cetorelli and Strahan (2003) find that restrictions on bank competition lead to an increase in bad lending decisions and a distraction of resources away from better borrowers.

[43] Berger and DeYoung (2001) find that parent banks influence the efficiency of their affiliates, although this effect tends to dissipate with an increase in distance between the locations of both entities.

average, firms are able to establish banking relationships within the state where their headquarters are located. Consequently, the geographical scope of the concentration measure should be at the state level.

Conc is defined to estimate the model with bank concentration. It is included as another measure having an impact on the stochastic discount factor in (11). Then, (14) is rewritten as:

$$\left(\frac{I}{K}\right)_{it} = \alpha_0 + \alpha_1\left(\frac{I}{K}\right)_{it-1} + \alpha_2\left(\frac{S}{K}\right)_{it} + \alpha_3\left(\frac{Cash}{K}\right)_{it} + \alpha_4\left(\frac{Cash}{K} * Intg\right)_{it} + \alpha_5\left(\frac{Cash}{K} * Conc\right)_{it} + f_i + h_{jt} + \varepsilon_{it} \quad (16)$$

In Columns (1) and (5) of Table 6A, *Intg* is assumed to have no impact on the cash-investment sensitivity coefficient, thus the model is estimated without this interaction. In Column (1) *Conc* is a dummy variable equal to one if the state has an HHI greater than 1800. This is considered the "highly concentrated" dummy. In Column (5) *Conc* is defined as an indicator equal to one if HHI is greater than the median for the whole sample.[44] Results show that firms are more financially constrained in highly concentrated states. At the same time, above median concentration levels reduce the cash-investment sensitivity. This non-monotonic relation is consistent with Cetorelli's (2001) findings on the negative effects of extreme levels of concentration.

Columns (2) through (4) and (6) through (8) in Table 6A show the results for the model described in (16). The first set of estimation use the highly concentrated dummy, while Columns (6) through (8) use the dummy indicating states with concentration above the median. These two groups of columns differ in the measure used to define *Intg*. Estimations including the interstate agreement dummy as the measure of integration ratify the findings in Table 4 that bank integration reduces the cash-investment sensitivity. Although in highly concentrated markets this reduction is offset completely

[44] The HHI median for deposits by state for the whole sample is 1016.

by the effect of market competition. For moderately concentrated markets, bank integration reduces significantly the level of financing constraints. Results are similar when continuous measures defined as the share of C&I and deposits in MSBs are included. Again, these finding ratify the empirical and theoretical evidence that some level of concentration is needed to allocate resources amongst the best borrowers.[45] However, as concentration becomes extreme, high loan costs and inefficient monitoring leads to less availability of credit.

Table 6B reports the estimations of (16) dividing the sample by size. Columns (1) and (3) show that bank integration reduces financing constraints for small firms even after controlling for concentration. For medium firms Columns (2) and (4) show that the positive relation between the integration interaction and investment becomes insignificant after controlling for concentration. This result is consistent with the explanation outlined in the previous section for medium size firms. As the number of large banks decrease, the premium on external finance for medium firms increase, thus increasing their financing constraints.

6.4. Sensitivity Analysis

Tables 7, 8 and 9 display sensitivity tests to assess the robustness of the key results reported in the previous sections. Variants of the model outlined in (14) are estimated including additional controls, modifying the sample used for estimation, the definition of the variables included and using definitions of financially constrained firms commonly used in the literature to asses the effect of bank integration.

Table 7 introduces intrastate deregulation as a separate effect influencing the stochastic discount factor. Strahan (2003) and Jayaratne and Strahan (1998) show that intrastate deregulation has a significant effect on income growth and bank efficiency at the state level. To separate the impact of intrastate from interstate deregulation, its interaction with cash stock in equation (14) is explicitly modeled. In Column (1)

[45] For an opposing argument see Boot and Thakor (2000). The authors argue that competition increases investment in relationship lending. This type of lending is mostly provided to firms with more asymmetric information problems.

intrastate deregulations enters by itself, but the coefficient on its interaction with cash stock is not significant. Column (2) includes both the interstate and intrastate interactions. While the former enters with a negative and significant coefficient, as in the other estimations, the latter enters with a positive and significant coefficient. This is explained by the effect of intrastate M&As on concentration as it is confirmed in Column (3). To control for possible simultaneous effects of both types of deregulation, Column (4) excludes those states were intra and inter state reforms were implemented within one year of difference.[46] Results show interstate deregulation has a significant and negative effect on financial constraints while intrastate deregulation has an insignificant effect. Finally, Column (5) analyzes the combined effect of both policies on financial constraints. The coefficient on the interaction is negative and significant and it does not differ from the one obtained for the interstate agreement dummy in Table 4. This result confirms the importance of cross-state entry deregulation, and differentiates it from the lifting of intrastate branching restrictions.

Table 8 reports the main model replacing *Sales/K* by a measure of Tobin's Q as proxy for *MPK* and *Cash/K* by cash flow divided by capital. This is the usual specification for the investment equation in the literature. Additionally, these estimations incorporate a measure of leverage and restrict the sample by excluding observations in some states. In Columns (1) and (2) Tobin's Q is defined as the ratio of market value plus book value of assets minus common equity and deferred taxes by the book value of assets.[47] Cash flow is defined as Income before Extraordinary Items plus Depreciation and Amortization divided by *K*. Columns (3) and (4) add *Leverage* to the main equation in (14) and it is defined as total debt by the book value of assets.

The coefficient on the interactions between cash flow and bank integration proxies are negative and significant for all specifications, confirming earlier results. The coefficient on Tobin's Q is positive and significant in Columns (1) and (2) suggesting that investment is highly correlated with this measure of *MPK*. The coefficient on

[46] The states excluded are: Louisiana, Massachusetts, Michigan, New Hampshire, Oklahoma, Oregon, Tennessee, Texas and West Virginia.
[47] Calculated at the start of the period.

Leverage in columns (3) and (4) is negative and significant. This suggests that the level of firm leverage affects investment due to the presence of informational asymmetries in debt markets.

Table 8 also addresses the difference in the number of firms by state observed in Table 2. California, New York and Texas have around one third of the firms and observations in the sample. These states will overweight in the cross-state regressions and could prevent smaller states from influencing the coefficients. To check if this sampling effect has an impact on the main results, Columns (5) and (6) estimate the model in Columns (1) and (4) of Table 4, excluding these states. The coefficient on the interaction of the interstate agreement dummy has the same magnitude. On the other hand, the coefficient on the interaction of the share of deposits decreases in value but still remains negative and significant. Additional, unreported results excluding individual states and regions further confirm these findings.

Table 9 divides the sample using *a priori* definitions commonly used in the literature of investment with financial constrains. In Columns (1) and (2) the dividend payout ratio serves as the measure to assign firms between the groups of financially constrained and unconstrained. Firms are in the latter set if their payout ratio is in the bottom three deciles of the distribution for the sample. Conversely, firms are classified as unconstrained if they are in the top three deciles. Results show that the sensitivity of investment to cash is considerably less for unconstrained firms. After integration it even becomes negative. For constrained firms this sensitivity is larger, but it is reduced by half after integration. These findings are consistent with the results in Fazzari et al. (1988). The differentiating finding is that cash-investment sensitivity changes after bank deregulation takes place. This temporal dimension hasn't been explored in the literature of investment under financial constraints.

In Columns (3) and (4) constrained firms are defined as those with no credit rating from Standard and Poor's for their long or short-term debt in any year in the sample and with a positive value of debt. Unconstrained are those with any rating of their public debt

in the sample. Results show that investment is not sensitive to the level of cash stocks for unconstrained firms. This implies that firms with any credit rating have access to external finance sources, limiting the amount of cash stock that they have to maintain to finance investment projects. On the other hand, constrained firms have a positive and significant correlation between cash stocks and investment. This sensitivity disappears after deregulation. Bank loans provided by MSBs may have mitigated frictions on external finance for those firms with limited access to credit as represented by their lack of rating.

Unreported estimates are also performed on the model in (14) using other methodologies. Instead of mean-differencing by state and year, these effects are proxied by observable variables like the states' growth of income and employment. Results are robust to these changes. Furthermore, using the Arellano and Bond (1991) estimator leaves unaltered the findings on the integration effect. Finally, balanced panels of firms with observations for more, or less than two years, before and after interstate agreements, are constructed to estimate the model. The coefficients on the integration interaction are still negative and significant.

These series of sensitivity test suggest that the results reported in Section 6.1. are robust to additional controls, variable definitions, model specification, estimation methodology and sample selection.

7. Bank Integration and the Firm's Cost of Credit

Table 10 shows a difference-in-difference analysis performed on some of the firms' financial variables for the period between 1976 and 1994. These estimations complement the results described in Section 6 by displaying the pattern of financing costs for firms before and after interstate acquisitions were allowed. In addition, indicator variables by size and their interactions with *Intg* are added to measure the effect of deregulation for firms at different scales. The specification used in these estimations is the following:

$$y_{it} = \beta_0 + \beta_1 Intg_{jt} + \sum_{h=1}^{2} \gamma_h Size_{it}^h + \sum_{h=1}^{2} \pi_h \left(Size_{it}^h * Intg_{jt} \right) + \delta X_{it} + \eta_i + \lambda_j + \mu_t + \varepsilon_{it} \quad (17)$$

Where *Intg* represents the interstate agreement dummy; $Size^h_{it}$ is an indicator variable equal to 1 for small firms (h=1) if real assets are below 61 million 1995 U.S. dollars; $Size^h_{it}$ is an indicator variable equal to 1 for medium firms (h=2) if real assets are between 61 million and 450 million in 1995 U.S. dollars in a particular year; X_{it} is a vector of firm specific controls; η_i is a firm specific effect; λ_j is a state specific effect; and μ_t measures time effects.

In Table 10, Columns (1) through (3) show the results for (17) excluding the *Size* indicator and its interaction with *Intg*. The coefficient on *Intg* measures the average effect of interstate bank entry deregulation on firm financial costs. Although both total interests scaled by total debt and real short interest increase, only the first one has a significant coefficient. There is an average increase in the ratio of total interest to debt of 13% after interstate agreements passed. This is explained by a decrease in total leverage.

In Columns (3) to (6) the complete model in (17) is reported. The short term interest rate as defined in Compustat, measures the average cost of the lines of credit that firms contract with banks.[48] The results in Column (5) show a significant decrease on this interest rate for small publicly-traded firms. After deregulation, this set of businesses paid half a percentage point less on their lines of credit. This is also reflected on their interest coverage, which increases by almost 12% after cross-state bank acquisitions are permitted. These two results support the findings in Section 6 on the effect of interstate deregulation on small-publicly traded firms. As external finance costs went down, financial constraints also decreased.

[48] Berger and Udell (1995) define lines of credit as being more "relationship driven". That is, the cost and collateral on these types of loan contracts are mostly determined by the relationship established between lender and borrower.

8. Conclusions

This paper uses data on publicly-traded U.S. firms in the manufacturing sector to examine the effect of interstate bank integration on borrower financing constraints. The results show that bank integration reduced the cash-investment sensitivity for this sample after the initial deregulation period in the eighties. Furthermore, small publicly-traded firms benefited the most from the increase in cross-state banking. These findings are robust to the inclusion of banking market structure as measured by a concentration index and to other forms of deregulation, especially the lifting of intrastate branching restrictions through M&As.

The effect of bank integration has been widely studied from the financial institution's perspective or at the state level. Few attempts had been made at analyzing the impact of interstate deregulation on borrowers. This study uses an indirect method taken from the investment literature to analyze the effect of integration on firm financing constraints. The benefit of using micro-data is that it helps to avoid problems of reverse causality and enables one to control for unobserved effects impossible to model using aggregate data.

As a policy question, bank integration or cross-border bank entry has been recommended as part of a set of reforms to increase efficiency in financial markets in developing countries. Financial liberalization has been linked to an increase in economic growth for these countries. At the cross-country micro-level, few studies have tackled the effect of financial integration on firms. The results shown in this paper serve as evidence that bank integration on average reduces borrowers' financial constraints for publicly-traded firms.

Future research in this area should focus on testing the different explanations outlined in the paper, which may have triggered this change in the level of financing constrains. In addition, this analysis ought to be extended to samples of small privately-held firms. Given their size and reduced transparency in terms of disclosure rules, these firms may face a higher degree of information asymmetry and therefore higher premiums

on external finance. Another extension would be to analyze non-manufacturing firms. Investment in these businesses requires better monitoring and screening by banks due to the lack of tangibility of their products. In this context, bank integration may have a positive or negative effect depending on the technology and efficiency of MSBs.

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Appendix 1: Sample Selection

Sample Selection: All observation in the Compustat North-America database provided by WRDS between 1975 and 2002. I use the period between 1976 and 1994 in the main estimations.

Deletion Criteria:

- Firms located outside the U.S.
- All firms with no information on its location (state).
- All firms outside the manufacturing sector (SIC 2000-3999).
- Firms with missing data for I/K, Sales/K, Cash/K and Real Assets.
- All firms located in South Dakota, Delaware and Puerto Rico.
- All firms with Assets<=0.
- All firms with Sales<=0.
- All firms with Capital<=0.
- All firms with Real Sales Growth <-100 or >100
- All firms with Sales/K<0, Cash/K<0 or I/K<0.
- All firms with Capital Stock Growth >100
- Top 1 and bottom 1 percentile of Sales/K, Cash/K and Tobin Q.
- Firms with less than 2 years before and after interstate agreement.

Appendix 2: Variable Definitions

Variable	***Acronym***	***Definition (Compustat Data Item)***
Assets		Total assets at the beginning of the period. (Compustat data item x6)
Capital Stock	*K*	Net Property, Plant and Equipment. (x8)
Cash Stock	*Cask/K*	Cash plus equivalents scaled by capital. (x1)
Cash Flow	*Cashfl/K*	Income Before Extraordinary Items plus Depreciation and Amortization. (x18+x14)
Current Ratio		Current assets divided by current liabilities. (x4/x5)
Total Debt		Total debt is defined as Long Term Debt plus Current Liabilities (x9+x34)
Investment	*I/K*	Gross Investment scaled by Capital. (x30/x8(t-1))
Interest Coverage		Operating income after depreciation scaled by interest expense. (x178/x15)
Leverage	*D/K*	The ratio of total debt to total assets. ((x9+x34)/x6))
Market Value		Market Value of Equity at the beginning of period t. (x25*x199)
Net Income Margin		Net Income before extraordinary items scaled by net sales. (x18/x12)
Net Sales	*S/K*	Net sales at the end of period t-1. Scaled by capital. (x12)
Real Short Term Interests		Weighted average interest rate for aggregate short-term borrowing deflated by the year to year change in the GDP deflator. (x105)
Return on Equity	*ROE*	Net Income before extraordinary items scaled by the book value of common equity. ((x18/x60)*100)
Tobin's Q	*tobin q*	Market value plus book value of assets minus common equity and deferred taxes by the book value of assets. ((x6-x60-x74+x25*x199)/x6)

Table 1: Share of Deposits Held by Multi-State Banks by State

Shares are calculated using Call Reports and bank deposit data from the FDIC. The source for the dates is Kroszner and Strahan (1999).

State	*1976-1982*	*1983-2002*	*Interstate Banking*
ALASKA	0.00	0.24	1982
ALABAMA	0.00	0.52	1987
ARKANSAS	0.00	0.25	1989
ARIZONA	0.28	0.79	1986
CALIFORNIA	0.14	0.65	1987
COLORADO	0.04	0.39	1988
CONNECTICUT	0.06	0.66	1983
DISTRICT OF COLUMBIA	0.09	0.76	1985
FLORIDA	0.01	0.61	1985
GEORGIA	0.00	0.56	1985
HAWAII	0.00	0.48	1995
IOWA	0.07	0.22	1991
IDAHO	0.38	0.80	1985
ILLINOIS	0.02	0.41	1986
INDIANA	0.00	0.43	1986
KANSAS	0.00	0.20	1992
KENTUCKY	0.00	0.40	1984
LOUISIANA	0.00	0.25	1987
MASSACHUSETTS	0.00	0.63	1983
MARYLAND	0.02	0.72	1985
MAINE	0.00	0.67	1978
MICHIGAN	0.02	0.60	1986
MINNESOTA	0.53	0.56	1986
MISSOURI	0.08	0.49	1986
MISSISSIPPI	0.00	0.30	1988
MONTANA	0.42	0.42	1993
NORTH CAROLINA	0.04	0.70	1985
NORTH DAKOTA	0.32	0.36	1991
NEBRASKA	0.08	0.30	1990
NEW HAMPSHIRE	0.00	0.38	1987
NEW JERSEY	0.00	0.52	1986
NEW MEXICO	0.12	0.43	1989
NEVADA	0.44	0.76	1985
NEW YORK	0.15	0.86	1982
OHIO	0.00	0.59	1985
OKLAHOMA	0.00	0.16	1987
OREGON	0.41	0.78	1986
PENNSYLVANIA	0.00	0.59	1986
RHODE ISLAND	0.07	0.73	1984
SOUTH CAROLINA	0.00	0.49	1986
TENNESSEE	0.02	0.47	1985
TEXAS	0.00	0.39	1987
UTAH	0.44	0.70	1984
VIRGINIA	0.05	0.58	1985
VERMONT	0.00	0.26	1988
WASHINGTON	0.09	0.71	1987
WISCONSIN	0.03	0.45	1987
WEST VIRGINIA	0.00	0.32	1988
WYOMING	0.14	0.41	1987
Mean	*0.13*	*0.50*	

Table 2: Sample Coverage for Firms by State

Firm level data is from COMPUSTAT. It includes publicly traded firms in the manufacturing sector (SIC 2000-3999) from 1976 to 1994. Sample selection details are described in Appendix 1.

State	*Number of firms*	*Pct. of total firms*	*Number of Observations*	*Pct. of total observations*	*Average years per firm*
ALABAMA	5	0.3%	83	0.3%	14.6
ARKANSAS	5	0.3%	80	0.3%	16.0
ARIZONA	9	0.6%	124	0.5%	13.8
CALIFORNIA	193	12.0%	2646	10.9%	13.7
COLORADO	22	1.4%	318	1.3%	14.5
CONNECTICUT	91	5.6%	1322	5.4%	14.5
DISTRICT OF COLUMBIA	2	0.1%	34	0.1%	17.0
FLORIDA	57	3.5%	821	3.4%	14.4
GEORGIA	25	1.6%	414	1.7%	16.6
IOWA	13	0.8%	207	0.9%	15.9
IDAHO	1	0.1%	18	0.1%	18.0
ILLINOIS	100	6.2%	1598	6.6%	16.0
INDIANA	33	2.0%	530	2.2%	16.1
KANSAS	13	0.8%	159	0.7%	12.2
KENTUCKY	6	0.4%	90	0.4%	15.0
LOUISIANA	4	0.2%	61	0.3%	15.3
MASSACHUSETTS	86	5.3%	1244	5.1%	14.5
MARYLAND	18	1.1%	267	1.1%	14.8
MAINE	2	0.1%	26	0.1%	13.0
MICHIGAN	61	3.8%	1020	4.2%	16.7
MINNESOTA	64	4.0%	947	3.9%	14.6
MISSOURI	34	2.1%	574	2.4%	16.9
MISSISSIPPI	2	0.1%	37	0.2%	18.5
NORTH CAROLINA	39	2.4%	624	2.6%	16.0
NEBRASKA	4	0.2%	58	0.2%	14.5
NEW HAMPSHIRE	8	0.5%	112	0.5%	14.0
NEW JERSEY	100	6.2%	1518	6.2%	15.1
NEW MEXICO	2	0.1%	33	0.1%	16.5
NEVADA	2	0.1%	25	0.1%	12.5
NEW YORK	204	12.7%	2897	11.9%	14.2
OHIO	88	5.5%	1439	5.9%	16.4
OKLAHOMA	9	0.6%	128	0.5%	14.2
OREGON	13	0.8%	209	0.9%	15.3
PENNSYLVANIA	95	5.9%	1539	6.3%	16.2
RHODE ISLAND	11	0.7%	154	0.6%	14.0
SOUTH CAROLINA	8	0.5%	116	0.5%	14.5
TENNESSEE	10	0.6%	154	0.6%	15.4
TEXAS	73	4.5%	1115	4.6%	15.3
UTAH	7	0.4%	85	0.3%	12.1
VIRGINIA	36	2.2%	582	2.4%	16.2
VERMONT	1	0.1%	19	0.1%	19.0
WASHINGTON	19	1.2%	254	1.0%	13.4
WISCONSIN	36	2.2%	605	2.5%	16.8
WEST VIRGINIA	1	0.1%	12	0.0%	12.0
Total	1612		24298		

Table 3: Summary Statistics for Firms

Firm level data is from Compustat North America. It includes publicly traded firms in the U.S. manufacturing sector (SIC 2000-3999) from 1976 to 1994. Sample selection details are described in Appendix 1. In Panel B, TotD represents Total Debt (Long Term and Current Liabilities), LTD is Long-Term Debt, Short-Term Borr. is Short-Term Borrowing (Lines of Credit), Curr. Ass. is Current Assets, Total Interest are the expenditures in interests, and Real Short-Term Interests is the rate of interests paid for Short-Term Borrowing controlling by inflation (change in the GDP deflator). Variables in Panel C are defined in Appendix 2.

Panel A

	Real Assets	***I/K***	***S/K***	***Cash/K***	***Cashfl/K***	***Tobin Q***
Mean	1667.6	0.265	6.192	0.497	0.301	1.348
Median	142.8	0.213	4.806	0.180	0.307	1.123
Maximum	223844.8	2.818	58.521	19.219	10.294	10.455
Percentile 75	683.3	0.331	7.373	0.485	0.474	1.510
Percentile 25	32.6	0.132	3.179	0.067	0.172	0.904
Minimum	0.249	0.000	0.161	0.000	-26.508	0.536
Std. Dev.	7637.6	0.207	5.204	1.070	0.747	0.776
Observations	24298	24298	24298	24298	24288	21062

Panel B

	TotD/Assets	***LTD/Assets***	***Sort-Term Borr./Curr. Ass.***	***Total Interests/ TotD***	***Real Short-Term Interests***
Mean	0.252	0.179	0.115	0.165	4.992
Median	0.224	0.155	0.060	0.102	5.699
Std. Dev.	0.223	0.170	0.702	2.190	6.356
Observations	24268	24269	15111	22666	15186

Panel C

	Current Ratio	***Interest Coverage***	***Net Income Margin***	***ROE***	***Real Sales Growth***
Mean	2.643	20.5	0.020	5.9	4.099
Median	2.228	4.0	0.037	11.5	3.372
Std. Dev.	2.010	281.7	0.223	574.2	19.458
Observations	23971	23158	24290	24286	22993

Table 4: Bank Integration and Financial Constraints

The dependent variables is $(I/K)_t$, the ratio of investment to capital in the current period. The model is given in (14). Estimation is by GMM(IV), state-year and fixed effects are removed prior to estimation. First and second lags of endogenous and predetermined variables and industry dummies (2 digit SIC) are used as instruments. Columns (1) through (5) differ in the definition of *Intg*, the variable that measures bank integration. In Column (1), *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. In Column (2), *Intg* is the share of commercial and industrial loans (C&I) in Multi-State banks (MSBs) by state and year. A Multi-State bank is an institution with at least branches in two different states. In Column (3) *Intg* is the share of assets in MSBs. In columns (4) and (5) *Intg* is the share of deposits in MSBs by state and year. S/K is the ratio of sales to capital at the beginning of the period. Cash/K is the ratio of the stock of cash and equivalents to capital at the beginning of the period. Hansen test is the p-value of the J-statistic for over-identifying restrictions (distributed chi-square).

	1976-1994				***1976-2002***
	Interstate Dummy (1)	***Share of C&I (2)***	***Share of Assets (3)***	***Share of Deposits (4)***	***Share of Deposits (5)***
I/K(t-1)	0.395***	0.418***	0.415***	0.407***	0.404***
	[0.010]	[0.016]	[0.016]	[0.015]	[0.008]
S/K	0.007***	0.006***	0.006***	0.007***	0.007***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Cash/K	0.014***	0.014***	0.013***	0.018***	0.021***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
*(Cash/K)*Intg*	-0.012***	-0.027***	-0.025***	-0.026***	-0.028***
	[0.004]	[0.007]	[0.007]	[0.005]	[0.005]
Constant	-0.005***	-0.005***	-0.005***	-0.005***	-0.006***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	17639	16745	16745	17639	22376
R2	0.09	0.07	0.07	0.09	0.09
Root MSE	0.16	0.17	0.17	0.16	0.15
Hansen test	0.3	0.36	0.38	0.26	0.23

Standard errors (in brackets) are adjusted for state clustering
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Bank Integration and Financial Constraints by Size (Interstate agreement)

The dependent variables is $(I/K)_t$, the ratio of investment to capital in the current period. The models are explained in Section 6.2.; variables are defined in Section 5. First and second lags of endogenous and predetermined variables and industry dummies (2 digit SIC) are used as instruments. This table expands the model estimated in Column (1) of Table 5. Columns (1) through (6) differ in the sample used for estimation. They are divided by the value of assets in 1995 US dollars. *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. S/K is the ratio of sales to capital at the beginning of the period. Cash/K is the ratio of the stock of cash and equivalents to capital at the beginning of the period. Hansen test is the p-value of the J-statistic for over-identifying restrictions (distributed chi-square).

	Less than 100m	***More than 100m***	***Less than Median***	***More than Median***	***Bottom Tercile***	***Intermediate Tercile***
	(1)	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
I/K(t-1)	0.355***	0.463***	0.389***	0.483***	0.378***	0.471***
	[0.016]	[0.014]	[0.017]	[0.014]	[0.020]	[0.013]
S/K	0.008***	0.001	0.007***	0.001	0.006***	0.005***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Cash/K	0.013***	0.037***	0.006**	0.037***	0.014**	0.024***
	[0.004]	[0.004]	[0.003]	[0.005]	[0.005]	[0.008]
*(Cash/K)*Intg*	-0.016***	-0.009***	-0.022***	-0.004	-0.025***	0.010**
	[0.004]	[0.003]	[0.003]	[0.004]	[0.005]	[0.005]
Constant	-0.007***	-0.003***	-0.008***	-0.003***	-0.007***	-0.007***
	[0.001]	[0.000]	[0.001]	[0.000]	[0.001]	[0.001]
Observations	7146	10493	7093	10546	5735	6133
R2	0.09	0.07	0.06	0.06	0.07	0.06
Root MSE	0.19	0.14	0.19	0.14	0.2	0.16
Hansen test	0.21	0.36	0.19	0.38	0.28	0.26

Standard errors (in brackets) are adjusted for state clustering

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

Table 6A: Bank Concentration, Bank Integration and Financial Constraints

The dependent variables is $(I/K)_t$, the ratio of investment to capital in the current period. The models are explained in section 6.3.; variables are defined in Section 5. The models are estimated for the 1976-1994 period. First and second lags of endogenous and predetermined variables and industry dummies (2 digit SIC) are used as instruments. In Columns (1) through (4) *Conc* is a dummy equal to one if the Herfindahl-Hirshman Index (HHI) for deposits by state is greater than 1800. In Columns (5) through (8) *Conc* is a dummy equal to one if the Herfindahl-Hirshman Index (HHI) for deposits by state is greater than the sample median. In Columns (2) and (6), *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. In Columns (3) and (7), *Intg* is the share of commercial and industrial loans (C&I) in Multi-State banks (MSBs) by state and year. A Multi-State bank is an institution with at least branches in two different states. In Columns (4) and (8), *Intg* is the share of deposits in MSBs. S/K is the ratio of sales to capital at the beginning of the period. Cash/K is the ratio of the stock of cash and equivalents to capital at the beginning of the period. Hansen test is the p-value of the J-statistic for over-identifying restrictions (distributed chi-square).

	Dummy =1 if HHI>1800				***Dummy=1 if HHI above Median***			
	No Intg	***Interstate Agreement***	***Share of C & I***	***Share of Deposits***	***No Intg***	***Interstate Agreement***	***Share of C & I***	***Share of Deposits***
	(1)	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***	***(7)***	***(8)***
I/K(t-1)	0.418***	0.400***	0.416***	0.403***	0.414***	0.392***	0.409***	0.400***
	[0.017]	[0.009]	[0.017]	[0.016]	[0.016]	[0.011]	[0.015]	[0.016]
S/K	0.006***	0.007***	0.006***	0.007***	0.007***	0.007***	0.006***	0.007***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Cash/K	0.010***	0.014***	0.015***	0.017***	0.017***	0.018***	0.019***	0.020***
	[0.003]	[0.004]	[0.004]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]
*(Cash/K)*Intg*		-0.014***	-0.025***	-0.027***		-0.013***	-0.026***	-0.026***
		[0.003]	[0.007]	[0.005]		[0.003]	[0.007]	[0.006]
*(Cash/K)*Conc*	0.022***	0.016***	0.024***	0.022***	-0.008**	-0.007*	-0.008*	-0.002
	[0.005]	[0.004]	[0.008]	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]
Constant	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	17639	17639	16745	17639	17639	17639	16745	17639
R2	0.08	0.09	0.07	0.09	0.09	0.09	0.07	0.09
Root MSE	0.16	0.16	0.17	0.16	0.16	0.16	0.17	0.16
Hansen test	0.24	0.28	0.33	0.22	0.25	0.32	0.39	0.32

Standard errors (in brackets) are adjusted for state clustering

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

Table 6B: Bank Concentration, Bank Integration, Size and Financial Constraints

The dependent variables is $(I/K)_t$, the ratio of investment to capital in the current period. The models are explained in section 6.3.; variables are defined in Section 5. The models are estimated for the 1976-1994 period. First and second lags of endogenous and predetermined variables and industry dummies (2 digit SIC) are used as instruments. In Columns (1) and (2) *Conc* is a dummy equal to one if the Herfindahl-Hirshman Index (HHI) for deposits by state is greater than 1800. In Columns (3) and (4) *Conc* is a dummy equal to one if the Herfindahl-Hirshman Index (HHI) for deposits by state is greater than the sample median. Columns (1) through (4) differ in the sample used for estimation. They are divided by the value of assets in 1995 US dollars. Columns (1) and (3) include those firms with less than 61 million in real assets. Columns (2) and (4) include those firms with real assets between 61 million and 450 million. *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. S/K is the ratio of sales to capital at the beginning of the period. Cash/K is the ratio of the stock of cash and equivalents to capital at the beginning of the period. Hansen test is the p-value of the J-statistic for over-identifying restrictions (distributed chi-square).

	Dummy =1 if HHI>1800		***Dummy=1 if HHI above Median***	
	Small	***Medium***	***Small***	***Medium***
	(1)	***(2)***	***(3)***	***(4)***
I/K(t-1)	0.439***	0.420***	0.422***	0.404***
	[0.025]	[0.014]	[0.027]	[0.016]
S/K	0.007***	0.007***	0.007***	0.006***
	[0.001]	[0.001]	[0.001]	[0.001]
Cash/K	0.007	0.011**	0.016***	0.005
	[0.006]	[0.004]	[0.005]	[0.006]
*(Cash/K)*Intg*	-0.025***	-0.004	-0.028***	-0.006
	[0.006]	[0.005]	[0.006]	[0.005]
*(Cash/K)*Conc*	-0.006	0.016**	-0.009	0.020***
	[0.007]	[0.008]	[0.009]	[0.004]
Constant	-0.006***	-0.007***	-0.005***	-0.008***
	[0.001]	[0.001]	[0.001]	[0.001]
Observations	4632	5911	4632	5911
R2	0.04	0.1	0.04	0.1
Root MSE	0.21	0.17	0.21	0.17
Hansen test	0.3	0.3	0.22	0.43

Standard errors (in brackets) are adjusted for state clustering
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Intra and Interstate Bank Integration and Financial Constraints

The dependent variables is $(I/K)_t$, the ratio of investment to capital in the current period. The models are explained in section 6.4.; variables are defined in Section 5. *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. *Intra* is a dummy variable equal to one if the state passed a law allowing intrastate banking through M&As. *Conc* is a dummy equal to one if the Herfindahl-Hirshman Index (HHI) for deposits by state is greater than 1800. S/K is the ratio of sales to capital at the beginning of the period. Cash/K is the ratio of the stock of cash and equivalents to capital at the beginning of the period. Hansen test is the p-value of the J-statistic for over-identifying restrictions (distributed chi-square).

	(1)	***(2)***	***(3)***	***(4)***	***(5)***
I/K(t-1)	0.409***	0.396***	0.399***	0.407***	0.395***
	[0.015]	[0.011]	[0.009]	[0.007]	[0.011]
S/K	0.007***	0.007***	0.006***	0.008***	0.007***
	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]
Cash/K	0.015***	0.010**	0.009**	0.021***	0.015***
	[0.005]	[0.004]	[0.004]	[0.004]	[0.003]
*(Cash/K)*Intra*	-0.004	0.011**	0.009	-0.002	
	[0.005]	[0.005]	[0.005]	[0.005]	
*(Cash/K)*Intg*		-0.020***	-0.019***	-0.024***	
		[0.003]	[0.003]	[0.002]	
*(Cash/K)*Intra*Intg*					-0.011***
					[0.003]
*(Cash/K)*Conc*			0.013***		
			[0.004]		
Constant	-0.005***	-0.005***	-0.005***	-0.004***	-0.005***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	17639	17639	17639	14654	17639
R2	0.09	0.09	0.08	0.07	0.09
Root MSE	0.16	0.16	0.16	0.16	0.16
Hansen test	0.29	0.27	0.32	0.36	0.28

Standard errors (in brackets) are adjusted for state clustering
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Bank Integration and Financial Constraints – Robustness Tests

The dependent variables is $(I/K)_t$, the ratio of investment to capital in the current period. The models are explained in Section 6.4.; variables are defined in Section 5. The models are estimated for the 1976-1994 period. First and second lags of endogenous and predetermined variables and industry dummies (2 digit SIC) are used as instruments. In Columns (1) and (3) *tobin q* is defined as the market to book ration. Cash flow is defined as Income Before Extraordinary Items plus Depreciation and Amortization divided by capital. In Columns (3) and (4) *Leverage* is defined as the ratio of Total Debt to the book value of Assets. In Columns (1), (3) and (5), *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. In Columns (2), (4) and (6), *Intg* is the share of deposits in Multi-State banks (MSBs) by state and year. A Multi-State bank is an institution with at least branches in two different states. S/K is the ratio of sales to capital at the beginning of the period. Cash/K is the ratio of the stock of cash and equivalents to capital at the beginning of the period. Columns (5) and (6) exclude firms incorporated in California, New York and Texas. Hansen test is the p-value of the J-statistic for over-identifying restrictions (distributed chi-square).

	Tobin Q and Cashflow		***Leverage***		***Exc. CA, NY, TX***	
	Interstate Agreement (1)	***Sh. of Deposits (2)***	***Interstate Agreement (3)***	***Sh. of Deposits (4)***	***Interstate Agreement (5)***	***Sh. of Deposits (6)***
I/K(t-1)	0.394***	0.399***	0.243***	0.231***	0.407***	0.414***
	[0.019]	[0.030]	[0.011]	[0.014]	[0.014]	[0.017]
tobin q	0.016***	0.014***				
	[0.005]	[0.004]				
Cashfl/K	0.088***	0.081***				
	[0.013]	[0.023]				
*(Cashfl/K)*Intg*	-0.046***	-0.038*				
	[0.015]	[0.022]				
Sales/k			0.008***	0.009***	0.006***	0.007***
			[0.001]	[0.001]	[0.001]	[0.001]
Cash/K			0.016***	0.023***	0.014***	0.021***
			[0.004]	[0.004]	[0.004]	[0.003]
*(Cash/K)*Intg*			-0.024***	-0.052***	-0.012***	-0.018***
			[0.003]	[0.005]	[0.003]	[0.005]
Leverage			-0.251***	-0.238***		
			[0.015]	[0.013]		
Constant	-0.001	-0.001	-0.005***	-0.006***	-0.004***	-0.004***
	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	15055	15055	17606	17606	13036	13036
N firms	44	44	44	44	41	41
R2	0.08	0.07	0.08	0.09	0.07	0.08
Root MSE	0.16	0.16	0.16	0.16	0.16	0.16
Hansen test	0.35	0.23	0.21	0.27	0.44	0.31

Standard errors (in brackets) are adjusted for state clustering

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

Table 9: Bank Integration - Constrained vs. Unconstrained

The dependent variables is $(I/K)_t$, the ratio of investment to capital in the current period. The models are explained in section 6.4.; variables are defined in section 5. The models are estimated for the 1976-1994 period. First and second lags of endogenous and predetermined variables and industry dummies (2 digit SIC) are used as instruments. This table expands the model estimated in Column (1) of Table 5. In Columns (1) and (2) firms are defined as constrained or unconstrained if their dividend payouts (total dividends by operating income) belong to the bottom or top deciles of the distribution respectively. In Columns (3) and (4) firms are constrained if they have no bond rating and positive debt and unconstrained if they have any public debt rating. *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. S/K is the ratio of sales to capital at the beginning of the period. Cash/K is the ratio of the stock of cash and equivalents to capital at the beginning of the period. Hansen test is the p-value of the J-statistic for over-identifying restrictions (distributed chi-square).

	Dividend Payout		***Bond Rating***	
	Unconstrained	***Constrained***	***Unconstrained***	***Constrained***
	(1)	***(2)***	***(3)***	***(4)***
I/K(t-1)	0.376***	0.400***	0.556***	0.338***
	[0.021]	[0.025]	[0.022]	[0.017]
S/K	0.008***	0.002	0.002***	0.010***
	[0.001]	[0.001]	[0.001]	[0.001]
Cash/K	0.008*	0.042***	0.006	0.039***
	[0.004]	[0.010]	[0.004]	[0.006]
*(Cash/K)*Intg*	-0.022***	-0.021**	-0.002	-0.043***
	[0.006]	[0.010]	[0.004]	[0.006]
Constant	-0.006***	-0.016***	-0.001***	-0.007***
	[0.001]	[0.001]	[0.000]	[0.000]
Observations	5852	4733	7868	9756
R2	0.07	0.08	0.01	0.11
Root MSE	0.14	0.19	0.15	0.17
Hansen test	0.55	0.32	0.45	0.29

Standard errors (in brackets) are adjusted for state clustering
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10: Cost of Credit Analysis

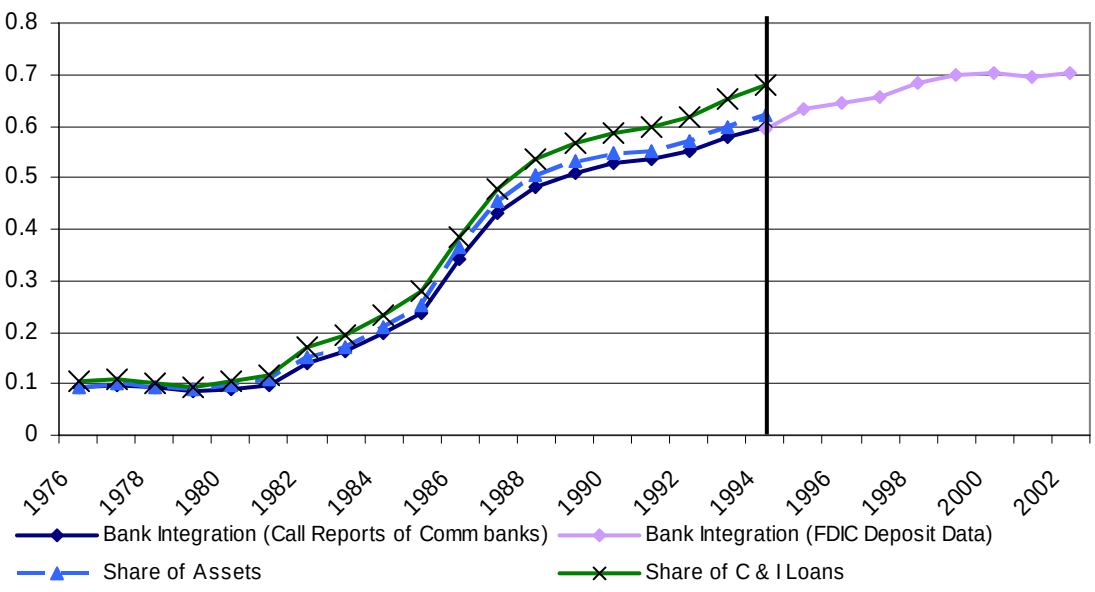
The dependent variable is displayed in the header to each column. Variables are defined in Appendix 2. The model is displayed in equation (17). Estimation is by OLS. *Intg* is a dummy variable equal to one if the state passed a law allowing interstate banking. *Small* and *Medium* are dummy variables equal to one if the value of the firm's lagged real assets is located in the bottom third or middle third respectively. Total Interest/TotD is total expenditures on interests divided by total debt, and Real Short-Term Interests is the rate of interests paid for Short-Term Borrowing controlling by inflation (change in the GDP deflator). Interest Coverage is operating income after depreciation scaled by interest expense. Columns (1) – (3) include the log of assets as a regressor. Column (1) and (4) include total leverage while Columns (2) and (5) include short term borrowing scaled by current assets. Estimations include firm, state and year fixed effects.

	Total Interests/ TotD (1)	***Real Short-Term Interests (2)***	***Interest Coverage (3)***	***Total Interests/ TotD (4)***	***Real Short-Term Interests (5)***	***Interest Coverage (6)***
Intg	0.137*	0.052	-0.11	0.180*	0.410*	1.54
	[0.076]	[0.173]	[8.538]	[0.097]	[0.223]	[8.455]
Small				0.105	0.251	-40.481*
				[0.070]	[0.287]	[22.430]
Medium				0.017	0.117	-1.621
				[0.068]	[0.262]	[13.338]
*Intg*Small*				-0.13	-0.892***	10.370*
				[0.101]	[0.218]	[6.000]
*Intg*Medium*				-0.118	-0.179	-17.905
				[0.100]	[0.226]	[11.356]
Constant				0.262***	4.440***	7.765
				[0.093]	[0.359]	[10.526]
Observations	22666	14927	23158	22666	14927	23158
R-squared	0.07	0.51	0.18	0.06	0.51	0.18

Robust standard errors in brackets

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

Figure 1: Banking Integration in the United States (1976-2002)*



* Banking integration is defined as the share of national bank deposits in total deposits

Figure 2: Herfindahl-Hirschman Index (State Level)