

## **Interstate Banking, Bank Information, and Corporate Acquisitions**

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### **Abstract**

Using the setting of staggered interstate bank deregulation, we provide causal evidence that information acquired by banks about borrowing firms in the lending process helps nonfinancial firms identify potential out-of-state targets. The likelihood that a firm becomes an out-of-state target increases after the state is deregulated, and more so when the firm has more out-of-state loans, and if the firm's bank is acquired by an out-of-state bank. This effect is stronger for firms subject to more asymmetric information, such as younger, smaller, or unrated firms. Acquirers of out-of-state (particularly private) targets receive significantly higher announcement returns after deregulation.

## 1. Introduction

Banks hold a special position in the capital markets by providing financing to firms subject to more asymmetric information problems (e.g., Fama 1985; Carey, Post, and Sharpe 1998; Hadlock and James 2002). The proprietary firm-specific, industry-specific and geographic-specific information banks collect in the lending process can also benefit other participants in the markets. Such information can be actively shared by banks with their clients through various financial services they provide or can be passively transmitted through loan announcements since outsiders typically assume that banks have favorable private information on the borrowing firms (e.g., James 1987; Lummer and McConnell 1989; Kroszner and Strahan 2001; Ivashina et al 2008). Building upon these arguments, we ask: can this information guide and improve the investment decisions of nonfinancial firms? In particular, can bank information increase the likelihood and efficiency of acquiring an informationally opaque target?

For many acquirers, there may be substantial asymmetric information between them and their potential targets if the targets are located far away, especially when the targets are younger, are smaller, are unrated, or are not publicly traded. Therefore when selecting their targets, acquirer firms have preference for geographically proximity (Kang and Kim 2008; Almazan, De Motta, Titman, and Uysal, 2010; Giroud 2013). However, if the asymmetric information problems can be eased by banks, a firm will have a larger set of potential targets to choose from, increasing its probability of finding a target with higher synergies.

In this paper, we use staggered interstate bank deregulation in the US during the 1980s and 1990s as an exogenous expansion of banks' information to study the impact of bank information on a firm's probability of becoming a cross-state acquisition target. Prior to interstate bank deregulation, banks were not allowed to extend their business beyond the state

borders. After a state passes interstate bank deregulation, however, the state permits banks from other states to (1) open branches in that state and (2) acquire assets of banks in that state. The literature shows that bank deregulation is associated with reductions in the segmentation of the capital markets, more geographically diversified banks, and increased distance between creditors and borrowing firms (Becker 2007; Petersen and Rajan, 2002; Goetz, Laeven, and Levine 2015). Building upon this literature, we argue that the better information flow following the integration of the capital market will reduce the degree of information asymmetry between acquires and potential targets, and therefore, increase the likelihood of cross-state acquisitions. At the state level, we investigate whether bank integration after deregulation leads to more cross-state acquisitions. At the firm level, we use detailed firm-bank linked data to specify the channels through which banks' information affects firms' acquisition decisions.

The alleviation of information asymmetry by banks may occur through either active or passive channels, assisting firms' acquisition decisions. First, as banks extend their business in foreign states, banks could actively share their newly learned information on those states with their borrowers through various financial services they provide, such as appointing a banker director on the board (Kroszner and Strahan, 2001; Hilscher and Şişli-Ciamarra 2013), intervening through loan approval or covenant violations (Nini Smith and Sufi, 2009), or directly matching their clients as acquirers and the targets (Ivashina et al., 2009). Those newly learned information may direct firms to make acquisitions in foreign states.<sup>1</sup> Second, as banks offer

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<sup>1</sup> Ivashina et al. (2009) study a special case when banks match their clients as the acquirer and target in acquisitions. However, legal restrictions may limit the extent to which banks can pass on confidential information about a borrowing client firm to other clients. For example, Regulation Fair Disclosure (Reg FD) mandates restrictions on conveying information privately to their clients without conveying the same information to other participants in the market. Ivashina et al. (2009) also raise the legal concern that banks may have breached their fiduciary duty when they disclose information learned in the lending process. Although the information intermediary role of banks is controversial, they conclude that, the line between the use of information generated in the course of a banking relationship and the use of information disclosed under a confidentiality agreement is, indeed, fuzzy.

more loans to out-of-state firms after deregulation, they certify the quality of those firms, making that more attractive as potential targets (e.g., James 1987; Lummer and McConnell 1989; Kroszner and Strahan 2001). Through the above two channels, nonfinancial firms can take advantage of expanded bank information after interstate bank deregulation to guide their acquisition decisions.

We focus our analysis on a firm's probability of becoming a cross-state acquisition target. We do this to eliminate the other concurrent effects of interstate bank deregulation that might have an effect on cross-state mergers and acquisitions. For example, when a firm in a deregulated state starts to receive loans from banks in other states, the volume of credit supply in this deregulated state will increase. This, in turn, can facilitate the acquisition activities in that state (see Harford and Uysal 2014) and lead to a higher probability that the firm becomes an acquirer or becomes a target of a within-state acquirer. But this should not lead to an increased probability that the firm becomes a target of an out-of-state acquirer (whose credit supply is not affected by deregulation in the target's state). In addition, the increased credit supply can relax the financial constraints for firms in the deregulated states and help them remain independent (Officer 2007; Erel, Jang and Weisbach 2015). Therefore, if after deregulation, there is an increase in the probability for a firm in the deregulated state to become a cross-state acquisition target, we argue that it is due to the expanded information role played by banks.

We start by showing that interstate bank deregulation has direct impact on cross-border acquisitions. We exploit the dynamic nature of interstate bank deregulation. States started in different years and followed different paths. Many states signed a series of bilateral or multilateral agreements with other states over almost two decades. Constructing proxies of the degree of deregulation as in Jiang et al (2016) and using a difference-in-differences method, we

establish a causal relationship between interstate bank deregulation and increased cross-state acquisitions. We find that the increase in the number of targets in cross-state acquisitions in the deregulated states (before and after deregulation) is significantly larger than that in the nonderegulated states over the same period. Importantly, by applying a triple-difference analysis, we find that states with low bank competition before deregulation are likely to have great increase in cross-state acquisitions after deregulation, suggesting that the information released through increased bank competition after deregulations greatly boosts corporate acquisitions. Furthermore, we confirm that the bank integration is the cause of the increase of cross-state acquisitions by employing the instrument variable approach used in Morgan, Rime, and Strahan (2004). We also conduct placebo tests to confirm that our findings are robust.

Existing literature shows that interstate bank deregulation has a broad impact on the economy.<sup>2</sup> In particular, interstate bank deregulation can synchronize business conditions among states and increase firm competition as a result of increased credit supply. These two previously shown outcomes of deregulation may lead to more cross-state acquisition activities, driving our state level analysis. However, the above two channels do not predict the impact of deregulation on cross-state acquisitions to be concentrated on firms that are directly influenced by deregulation by taking out loans from out-of-state banks. By contrast, following our information argument, firms that are able to obtain out-of-state loans should be the ones that release the most information through out-of-state banks. Therefore, our information argument predicts that firms that have lending relationship with out-of-state banks should be the ones that are targeted by out-

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<sup>2</sup> The impacts of interstate bank deregulation include: boosting competition among banks (Jayaratne and Strahan, 1998; Stiroh and Strahan, 2003; Johnson and Rice, 2008), changing industry structures (Bertrand, Schoar, and Thesmar, 2007; Cetorelli, and Strahan, 2006), boosting economic growth (Jayaratne and Strahan, 1998), reducing income inequality (Beck, Levine, and Levkov, 2010), making state economic business cycles more synchronous (Morgan, Rime, and Strahan, 2004), making banking systems—and state economies—more integrated (e.g. Michalski and Ors 2012).

of-state acquirers. To show this, we use firm-bank linked data to directly examine the connection between interstate banking activities and cross-state acquisitions at the firm level. These tests establish the exact mechanism through which interstate bank deregulation mitigates information asymmetry and boosts cross-state acquisitions.

We first present evidence that a firm's out-of-state loans are positively associated with its likelihood of becoming a target. On average, the existence of a firm's out-of-state loan increases the firm's probability of becoming a cross-state acquisition target to 30%. Considering that a firm's unconditional probability of being acquired in the Compustat sample is only 2.5%, the impact of out-of-state loans is large. Importantly, the probability that an acquirer is from the headquarter state of the target's out-of-state bank is 16.7%, eight times the probability that the acquirer is from any other state (i.e., 2%).

Next, using a difference-in-differences method, we present direct evidence that firms are more likely to become targets in cross-state acquisitions after their banks are acquired by out-of-state banks. Specifically, our treatment group is a set of firms that has loans from banks acquired by out-of-state banks after interstate bank deregulation. Our control group is a matched set of firms with loans from banks *not* acquired by out-of-state banks. We find that the increase in the probability of being a cross-state acquisition target for a treated firm (before and after the bank acquisitions) is two times that for a control firm during the same period.

We then find that firms with more geographically diversified banks are more likely to acquire out-of-state targets. The existence of bank loans statistically increases a firm's probability of making both within-state and cross-state acquisition bids. However, if a firm borrows from a bank with assets in other states, it is much more likely to bid for an out-of-state target, but not for a within-state target. The odds of becoming an out-of-state acquirer for firms

with a loan from geographically diversified banks are 2.175 ( $p < 0.01$ , Column 6) times of those with no such loans. This results eliminate the concern that the increased credit supply after deregulation improve firms' quality, making them more attractive targets.

If interstate banking activities alleviate information asymmetry for cross-state acquisitions, firms subject to asymmetric information problems should be more likely targeted in cross-state acquisitions after deregulation. We separate our sample based on whether the firm has a credit rating, whether it is a small firm, and whether it is a young firm, in terms of the years of incorporation. We find that the increased probability of becoming a cross-state acquisition target through out-of-state bank loans is concentrated within unrated firms, smaller firms, and younger firms. Also, more targets come from states geographically far away. Overall, our evidence is consistent with the increased role of banks in alleviating informational asymmetry about target firms after deregulation.

Ultimately, if bank information improves the efficiency of acquisition decisions, by increasing the set of potential targets and by alleviating informational asymmetry between acquirers and targets, the acquisitions made after deregulation should be more value enhancing for acquirers than are those before deregulation. We find that the average announcement return of acquires (abnormal return) in cross-state acquisitions is significantly higher after interstate bank deregulation than before deregulation. The increased acquirer announcement return is the result of more private firms being identified as targets, as well as higher announcement returns for acquirers of private targets, due to better information environment after deregulation. We also document that, before deregulation, the acquirer's return of out-of-state targets was lower than that of within-state targets, but, after deregulation, this difference disappears. This result suggests

that, after deregulation, the information environment of cross-state acquisitions is as good as that of within-state acquisitions.

Together, our evidence shows that, in an economy with information asymmetry, banks provide critical private information that facilitates investment. Using staggered interstate bank deregulation, we can draw causal inference on the impact of bank information on corporate acquisition decisions. The role of bank information appears to be most important for targets difficult to value because they are located far away, and are less known to potential acquirers due to being small in size, young, unrated, and, possibly, not followed by other information producers.

We make several contributions to the literature. Our results provide evidence for the importance of a well-functioning banking sector to the real economy, beyond that of providing finance. Bank lending has been noted as the most important channel of external finance (Gorton and Winton 2003). While a major focus of the finance literature has been the credit supply function of bank lending (e.g., Strahan and Rice 2010; Amore, Schneider and Zaldokas 2013), we focus on the information role of bank lending and its positive externality on corporate investments and the market for corporate control. We show that the expanded information set of the banking sector after deregulation has improved the quality of mergers and acquisitions in the corporate sector. Prior literature shows that bank deregulation improve the integration of U.S economy (e.g. Morgan, Rime, and Strahan. 2004). Our results provide one unexplored channel – mergers of firms in different states – through which the economy is better integrated.

Second, a long literature advocates for the unique information advantages of banks (Fama 1985; James 1987; Lummer and McConnell 1989; Carey, Post, and Sharpe 1998; Dahiya, Puri, and Saunders 2003; Demiroglu and James 2010). Most of the empirical evidence focuses on the

market's reactions to bank loan announcements (or bank loan sales) to show the information content of bank loans. We provide evidence linking the effect of the expanded information set of banks on the increased efficiency of merger and acquisition decisions taken by nonfinancial firms.

Third, our study is in line with research showing that intermediaries facilitate merger and acquisition activities and lead to higher-quality takeovers. To our understanding, the literature has focused on the role of banks as financiers to acquirers in the merger and acquisition setting (e.g., Bharadwaj and Shivdasani 2003). In this study, we show that the corporate sector can use bank information to expand its potential target set to include firms both geographically far away and informationally challenging. Our evidence could provide the first step in understanding the information role of banks in corporate investment decisions.

## **2. Development of Hypotheses**

It is well established in the literature that banks specialize in lending to firms with information problems (e.g., Carey, Post, and Sharpe 1998; Hadlock and James 2002). Market participants also recognize banks' information advantages and infer information from banks' lending behavior. For example, bank loan announcements or renewals are usually followed by positive stock returns because outsiders infer that banks must have some favorable information on borrowing firms unknown to the public (e.g., James 1987; Lummer and McConnell 1989). Demiroglu and Jame (2010) show that the stock markets even react to the specific terms in bank loan contracts. By contrast, when banks unload loans from their balance sheet by selling loans in the secondary loan market, stock markets respond negatively, in general (e.g., Dahiya, Puri, and Saunders, 2003).

Before interstate bank deregulation, banks were not allowed to extend their business beyond the state borders under laws such as the McFadden Act of 1927 and the Douglas Amendment to the Bank Holding Company Act of 1956. However, starting in 1978, when Maine lifted the restriction on out-of-state banks, states in the United States went through a process that lasted for two decades and resulted in removing the restrictions on the geographic expansion of banking activities. Specifically, when a state passes interstate bank deregulation, it permits banks from other states to open branches in that state and to acquire assets of banks (such as a branch) in that state.

Banks' information about firms in other states extends from making loans to firms in other states and from acquiring bank assets in other states. After interstate bank deregulation, banks can establish local branches to make loans to borrowers in other states. Through the physical presence in other states, banks acquire private and soft information about these firms that they did not previously have. Then, after interstate bank deregulation, when a bank acquires bank assets from another state (such as a branch or an entire bank), the acquiring bank can augment its knowledge about the borrowing firms in the other state.

If bank information provides useful guidance to nonfinancial firms on their acquisition decisions of out-of-state targets, as banks' information boundaries expand to new states after deregulation, more out-of-state targets will be identified through the newly learned information. This implies the following hypothesis:

H1: Firms in states that have passed the interstate banking deregulation are more likely to be a cross-state acquisition target.

We identify two channels through which out-of-state banks obtain new information: (1) offering loans to firms in the deregulated states; and (2) acquiring bank assets in the deregulated

states. Firms that are influenced by these two interstate banking activities should more likely be targeted. We have the following two hypotheses:

H2a: Firms that receive more out-of-state loans after bank deregulation are more likely to become targets of out-of-state acquirers.

H2b: Firms whose banks' assets are acquired by out-of-state banks after bank deregulation are more likely to become targets of out-of-state acquirers.

For a given acquirer, potential targets from states farther away are subject to more information asymmetry. Therefore, bank information should be more necessary and helpful for identifying targets that are located in other states, especially those that are geographically farther. This implies the following hypothesis:

H3a: Firms in states that have adopted bank deregulation would have acquirers located geographically farther.

As interstate bank deregulation increases bank competition and credit supply, even firms with more opaque information can obtain bank loans, even from out-of-state banks. Such firms are also the ones whose information is not easily accessible by out-of-state acquirers. Therefore, if bank information alleviates information asymmetry, firms with more opaque information might be particularly affected by the expansion in bank information and its transmittal.

H3b: The effect of bank information (after deregulation) on the probability of a firm being a cross-state acquisition target is stronger for opaque firms.

Finally, if banks' expanded information due to deregulation helps firms better identify out-of-state targets with higher synergies, the wealth effects and correspondingly the announcement effects on the acquirer stocks should be higher after deregulation.

H4: The cumulative abnormal returns around the acquisition announcements should be higher for acquirers in cross-state acquisitions after bank deregulation.

### **3. Sample and Data**

#### **3.1 Sample construction**

From the Security Data Corporation's (SDC) Mergers and Corporate Transactions database, we obtain mergers and acquisitions in the United States that were announced between 1981 and 2000. We exclude LBOs, spin-offs, recapitalizations, self-tender offers, exchange offers, repurchases, partial equity-stake purchases, acquisitions of remaining interest, and privatizations, as well as deals in which the target or the acquirer is in the financial or utilities industry. Since we are interested in the influence of banks' information on corporate decision to acquire, we include all bids, regardless of whether they were eventually completed. We differentiate between acquisitions with the acquirer and the target in the same state (i.e., within-state acquisitions) and those with the acquirer and the target in a different state (i.e., cross-state acquisitions).

Following the literature on U.S. banking deregulation, we exclude Delaware and South Dakota because these states were subject to special tax incentives for credit card banks (Morgan, Rime, and Strahan 2004). This ensures our tests capture the impact of interstate bank deregulation. Our state-level sample comprises of 925 state-year observations.

To explore the specific mechanisms through which interstate bank deregulation influences a firm's probability of becoming a target, our firm-level sample is all the nonfinancial and nonutility firms in the Compustat universe between 1981 and 2000. We merge information on acquisitions from the SDC into this sample to create a dummy variable that indicates whether the firm is a target in a given year.

### 3.2 Interstate bank deregulation and measures of interstate banking activities

The data on the first year that a state allows interstate banking is from Amore, Schneider, and Alminas (2013). Using these data, we construct two main variables for deregulation. “Deregulation dummy” equals zero before a given state has passed interstate bank deregulation and one after deregulation. “Deregulated year” equals zero before deregulation and equals the number of years since deregulation after the state has passed interstate bank deregulation.

More recently, Goetz, Laeven, and Levine (2013, 2016) and Jiang, Levine and Lin (2016) exploit the dynamic process of each state’s removal of impediments to out-of-state banks. Following their method and using data from Amel (2000), we construct two additional measures of interstate bank deregulation. “Degree of deregulation for State  $j$  at year  $t$ ” is calculated

as  $\ln(\sum_{i \neq j}^N Dummy_{State_i} + 1)$ , where  $Dummy_{State_i}$  equals to one if State  $j$  has started to deregulate at year  $t$  and zero otherwise.  $N$  is the total number of the states. “Weighted degree of deregulation

for State  $j$  at year  $t$ ” is calculated as

$$\ln\left(\frac{\sum_{i \neq j}^N Dummy_{State_i} * (\text{Distance between State}_i \text{ and State}_j)}{\sum_{k \neq j}^N \text{Distance between State}_k \text{ and State}_j} + 1\right)$$

where  $N$  is the total number of the states in our sample.

Data on the two interstate banking activities—out-of-state loans and interstate bank asset acquisitions—are collected from three different sources. First, out-of-state loans are collected from syndicated loan issuances in the Securities Data Corporation’s (SDC) New Issues database. The SDC begins its syndicated loan coverage with 1980 and covers most of the years since the

states in the United States passed interstate bank deregulation.<sup>3</sup> Out-of-state loans are identified if any of the lead banks' headquarters different from the borrowing firms. Following Ivashina et al. (2009), a bank is called a lead bank if the role of this bank in the syndicated loan is the "Administrative agent". If the syndicated loan does not have any "Administrative agent", we identify the lead banks with any of the five titles: "Lead arranger", "Lead bank", "Lead manager", "Agent" or "Arranger." At the state-pair level, we aggregate the number and value of all the syndicated loans from banks in state  $j$  to borrowing firms in state  $i$  at year  $t$ .

Second, the information on interstate bank asset acquisitions is from the bank financial statements (the so-called *Call Reports*) that all U.S. banks report to their federal financial regulators. We construct the geographic distributions of assets for each lead bank using the financial statement of all its local branches and subsidiary banks. Following the spirit of Morgan, Rime, and Strahan (2004), at the state level, we define bank asset acquisition as the percentage of bank assets in state  $i$  owned by banks in state  $j$ .

Third, an important interstate bank asset acquisition is the mergers of banks from different states. For all the lead banks in our sample, we collect bank merger information from the bank merger files of the Chicago Federal Reserve Bank. These bank merger files include all mergers and acquisitions of banks and bank holding companies (BHC) that have occurred since 1976.

### **3.3 Summary statistics**

Table 1 presents the summary statistics of our key variables. Every year, the average state has 4.21 syndicated loans, 2.98 cross-state bank mergers and acquisitions, and 7.12 cross-state

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<sup>3</sup> We do not use syndicated loan information from LPC-DealScan because DealScan starts its coverage from 1988, when the majority of states in the United States already had deregulated to allow interstate banking activities.

firm acquisitions, and 48.3% of the state's bank assets are owned by banks from other states. Within public firms, firms that borrow out-of-state syndicated loans or become targets or acquirers are larger and more profitable than the average Compustat firms.

We also match the borrowing firms in the SDC syndicated loan issuance data with the acquirers and targets in the SDC mergers and acquisition data. We find that only eight acquirers share a bank with their out-of-state targets. Considering that there are 13,796 cross-state acquisition bids during our sample period, the likelihood is very small that banks actively match acquirers and targets by transferring information on one client (the target) directly to another client (the acquirer).<sup>4</sup>

Panel A of Figure 1 presents the average number of cross-state bank asset acquisitions in a state from five years before deregulation to ten years after deregulation. The 95% confidence intervals are also presented. Consistent with the previous literature on interstate bank deregulation (e.g., Morgan, Rime, and Strahan 2004), the out-of-state bank ownership rises significantly after deregulation. Panel B of Figure 1 presents the average number of out-of-state loans, we find that interstate bank deregulation changes bank behavior considerably. The number of out-of-state bank loans rise steadily after deregulation.

For both within-state and cross-state acquisitions, we show in Figure 2 the state-level average number of targets from five years before deregulation to ten years after deregulation. We find that the number of targets in a state involved in within-state and cross-state acquisitions stays stable before interstate bank deregulation and starts to increase only after the state has allowed interstate banking activities. The increase in the number of targets in a state remains significant for years after deregulation. Last, but not least, the number of target firms in cross-

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<sup>4</sup> Using information from DealScan database for a different time period (1992–2005), Ivashina et al. (2009) find that, out of 1,454 hostile takeovers, 107 acquirers share the same bank as their targets.

state acquisitions grows much faster than that in within-state acquisitions; this implies that the increase in cross-state acquisitions is less likely driven by contemporaneous state-level shocks to mergers and acquisitions.

#### 4. Interstate Bank Deregulation and Cross-State Acquisitions

##### 4.1 State-level analysis

To test hypothesis 1, we apply the difference-in-differences, triple differences and two-stage least square approaches to examine whether interstate bank deregulation increases targets in cross-state acquisitions for each state during 1981–2000.

##### 4.1.1 Difference-in-differences estimation

The basic equation we estimate is:

$$\text{Log (Number of cross-state targets+1)}_{jt} = \alpha_j + \alpha_t + \beta_{\text{dummy}} \times \text{Deregulation}_{jt-1} + \gamma_{it-1} + \varepsilon_{jt-1}. \quad (1)$$

In Equation (1), the number of cross-state targets<sub>jt</sub> is the number of firms in state *j* that have become cross-state targets.  $\alpha_j$  and  $\alpha_t$  are state and year fixed effects;  $\gamma_{jt-1}$  is fixed effects of passage of antitakeover laws; and  $\varepsilon_{jt-1}$  is the error term in state *j* (the target state). We also include GSP, GSP growth and HHI index of the banking industry as control variables. Because of the count-based nature of our dependent variables, we use the logarithm of dependent variables and robust ordinary least-squares (OLS) models. We cluster standard errors at the state level for all our state-level regressions.<sup>5</sup>

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<sup>5</sup> This addresses two important concerns. First, that all firms in a given year and state are affected by the same “shock” (namely, interstate bank deregulation) may induce correlation of the error terms within each state-year (or state-pair-year) (Moulton 1990; Donald and Lang 2007). Second, and this is an intrinsic problem of the difference-in-differences approach, that the deregulation dummy changes little over time, being zero before and one after the deregulation, may induce serial correlation of the error terms (Bertrand, Duflo, and Mullainathan 2004). Either problem can lead to a serious understatement of the standard errors. We also construct a placebo test to adjust for the standard errors in Section 4.2.

Since states deregulated at different times, we use states that had not deregulated at a point in time to control for potentially confounding effects. Specifically, our treatment groups are the state-pairs with target states deregulating at year  $t$ ; our control groups are the state-pairs in which the target states had not yet passed interstate bank deregulation by year  $t$ . We estimate a difference-in-differences model: the difference in cross-state acquisitions in the treatment groups before and after deregulation, compared with the difference in the control groups during the same period.

In Column (1), our measures of deregulation are “Deregulation dummy” and “Deregulation years”. Note the “deregulation dummy”, which is, in fact, the interaction of the state dummy (treatment variable) and the year variable. Similarly, “deregulated years” is the interaction of the state dummy (treatment variable) and the number of years since deregulation. Following Morgan, Rime, and Strahan (2004), we allow the impact of interstate bank deregulation on firm acquisition activities to emerge over time. By including both the deregulation dummy and deregulated years, we can capture the difference between pre-deregulation and post-deregulation and the time trend after deregulation. We find that interstate bank deregulation leads to a raise in the number of cross-state acquisitions. In particular, the coefficient of “deregulated years” is positive and significant at the 1% level, indicating that a state is likely to have more firms targeted by acquirers from other states as time elapses after deregulation.

In Column (2) and (3), we use “Degree of deregulation $_{jt}$ ” and “Weighted degree of deregulation $_{jt}$ ” to capture the dynamic process of each state’s removal of impediments to out-of-state banks. The coefficients on these two variables report the impact of the number of states whose banks are allowed to enter state  $j$  at year  $t$  on the number of firms becoming a cross-state

acquisition target in state  $j$ . The coefficients of “Degree of deregulation $_{jt}$ ” and “Weighted degree of deregulation $_{jt}$ ” are both significantly positive, indicating that the total number of cross-border acquisitions reacts to the geographic expansion of the banking system. One thing to notice is that the economic impact of “Weighted degree of deregulation $_{jt}$ ” is much larger than that of the “Degree of deregulation $_{jt}$ ,” indicating that the impact of deregulation on cross-border acquisitions are stronger when a state is opened up to longer-distant states.

We also construct robustness checks by (1) excluding state pairs with no cross-state acquisitions, and (2) using the total value of cross-state targets as dependent variable. Both tests show qualitatively similar results.

The difference-in-differences estimator is subject to a number of limitations. For example, the estimation is only consistent if the differences not due to deregulation—in firm’s cross-state acquisitions between the treated and the control groups—remain constant over time (parallel tendency). However, the previously discussed Figures 2 and 3 suggest that the parallel tendency before deregulation is met and the reverse causality is unlikely.

Another concern is that interstate banking deregulation may not be random, but, may, in fact, be driven by local economic and political dynamics. For instance, if firms in a state have plenty of growth opportunities, but local banks cannot meet their financial needs, they will actively lobby for interstate banking deregulations. To eliminate this concern, we construct a placebo test by applying fictitious deregulations. We expect the period-specific outcomes to be similar (and close to zero) before and after the fictitious deregulations.

We follow Bertrand, Duflo, and Mullainathan (2004) and estimate the distribution of the  $t$ -statistics of “deregulation dummy” and “deregulated years” in Column 1 of Table 2 from 500 simulated fictitious deregulations to each state. We then assess the statistical significance of the

original coefficient estimates by locating their  $t$ -statistics in the distribution of the simulated  $t$ -statistics in Figure 3. Because these deregulations are fictitious, a significant “effect” at the 5% level should be found roughly 5% of the time. Figure 5 shows that the cutting points for 5% of the simulations are -1.69 and 1.98 for “deregulation dummy” and -1.90 and 1.79 for “deregulated years”. Since the critical values at 5% of normal distribution are -1.96 and 1.96, the fictitious deregulations we construct have insignificant impact on the cross-border acquisitions. Therefore, we should not have reverse causality problems.

#### **4.1.2 Triple-differences estimation**

One caveat of the above results is that deregulation itself could be endogenous. That is, the deregulated states may share some unobservable characteristics that may determine both deregulation and more cross-state acquisitions. We separate states based on the level of their pre-deregulation credit supply. States with low pre-deregulation credit supply are in greater financial need and are likely to be more affected by deregulation, giving rise to more interstate banking activities. Consequently, the effect of bank deregulation on cross-state acquisitions should be stronger for such states. Expanded bank information after interstate bank deregulation should have a stronger effect on cross-state acquisitions for states more likely to take advantage of the newly permitted interstate banking activities. In Columns 4, we estimate the effects of deregulation on cross-state acquisitions in a state as a function of the ex ante demand for bank loans in that state. As a metric for the ex ante demand for bank loans for a state, we calculate the HHI of banking industry in the state one year before its deregulation. The literature on bank deregulation has shown that an important consequence of bank deregulation is to increase bank competition (e.g. Jayaratne and Strahan, 1998; Stiroh and Strahan, 2003 and Johnson and Rice, 2008). Therefore we expect that the states with lower bank competition before deregulation

should be more affected than those with higher competition. Specifically, we test the following regression:

$$\text{Log (Number of cross-state targets+1)}_{jt} = \alpha_j + \alpha_t + \beta \text{ Deregulation}_{jt-1} \times \text{Ex ante demand for bank loans}_j + \gamma_{jt-1} + \varepsilon_{jt-1}. \quad (2)$$

The control variables in Equation (2) are defined the same as those in Equation (1). The implicit assumption here is that the states that have a higher demand for more bank financing are more likely to observe growth in interstate banking activities after deregulation. Specifically, we run triple-difference regressions to account for unobservable characteristics that may incentivize more cross-state acquisitions of targets within deregulated states. This method controls for aggregate trends in each state and other deregulation-induced changes in cross-state acquisitions. Furthermore, by comparing the two groups before and after deregulation, the analysis unravels the effect of state identity from the effect of deregulation.

Our triple-difference estimates confirm that states with high pre-deregulation financial needs are more likely to see out-of-state acquirers after deregulation. By taking into consideration a state's likelihood of taking advantage of the interstate banking activities, we find that the effect of deregulation on cross-state acquisitions is much more meaningful than the results in the prior columns. For example, for a deregulated state, a one-standard-deviation increase in the pre-deregulation HHI index is associated with over 19.2% ( $\exp(2.262 \cdot 0.08) - 1$ ) increase in the number of targets in cross-state acquisitions after ten years of deregulation. In sum, our triple-difference regressions not only reinforce our causal relationship between bank deregulation and more targets in cross-state acquisitions but they also point out the specific mechanism of this causal relationship, that is, the increased interstate banking activities.

#### **4.1.3 Instrument variable regressions**

While difference-in-differences and triple difference models look at the impact of interstate deregulation on cross-state M&As, they do not allow us to examine the impact of actual bank entry. In a second set of regressions we examine the impact of actual banking integration, as measured by the fraction of interstate banking assets over the total banking assets in each state, on the number of out of state target. We follow Morgan, Rime, and Strahan (2004) and instrument the potentially endogenous with deregulation dummy and deregulation years. The two-stage least square estimates of the log-linear model with state year and anti-takeover law fixed effects are presented in Column (5) and (6) in Table 2. We find that the coefficient in front of instrumented Bank Integration variable is significant at 1% level.

#### **4.2 Interstate bank deregulation and out-of-state loans**

To examine the effects of actual bank entry on out of state loan issuance, we estimate the impact of test variable is “Bank integration”, which is potentially endogenous if, following deregulation banks chose to enter states with which their home state’s economy is integrated. Again we follow Morgan, Rime, and Strahan (2004) and use as instruments one indicator variables that keep track of whether the target states have experienced liberalization, and the other variables that measure the number of years since banking deregulation occurred for the same states. The two-stage least square estimates of the log-linear model with state year and anti-takeover law fixed effects are presented in Table 3. The coefficient in front of instrumented “Bank integration” variable is significant at 5% level, indicating that the bank integration is the cause of the increase of out-of-state loans after deregulation.

#### **5. The Mechanisms of Alleviate of Information Asymmetry**

One concern of our state-level results is that, instead of the alleviation of information asymmetry, other impacts of deregulation shown in the existing literature may drive the results.

For example, the economic integration of two states that accompanies interstate banking (e.g. Morgan, Rime, and Strahan. 2004) could foster cross-border M&A activity between the two states. The intensified firm competition after interstate bank deregulation (e.g. Bertrand, Schoar, and Thesmar, 2007 and Cetorelli, and Strahan, 2006) could also spur cross-border M&A activities. However, the above two channels do not predict the impact of deregulation on cross-state acquisitions to be concentrated on firms that are directly influenced by deregulation by taking out loans from out-of-state banks. By contrast, following our information argument, firms that are able to obtain out-of-state loans should be the ones that release the most information through out-of-state banks. Therefore, our information argument predicts that firms that have lending relationships with out-of-state banks should be the ones that are targeted by out-of-state acquirers. In this section, we use firm-bank linked data to establish the exact mechanism through which interstate bank deregulation mitigates information asymmetry and boosts cross-state acquisitions.

### **5.1 Out-of-state loans and the probability of becoming a target of cross state acquisition**

In this section, we examine the direct link between out-of-state loans and firms' likelihood of becoming a cross-state acquisition target. Specifically, we estimate a multinomial logistic model:

$$\text{Prob (target)}_{kt} = \alpha_i + \alpha_t + \beta \text{ out-of-state loans}_{kt} + \gamma X_{kt} + \varepsilon_{kt}. \quad (5)$$

We use  $i$  to indicate states,  $k$  to indicate firms, and  $t$  to indicate years. The dependent variable is a categorical variable that indicates whether a firm is an acquisition target. It equals two if the firm is a cross-state acquisition target, equals one if the firm is a within-state acquisition target, and equals zero if the firm remains independent. We estimate a multinomial

logistic regression that includes three outcomes to mitigate the concern that our results are driven by some state-level contemporaneous shocks to mergers and acquisitions. Note that targets in a state involved in either within-state or cross-state acquisitions are subject to the same shocks. Therefore, the different impacts of the interstate banking activities on the probability of being a cross-state acquisition target versus a within-state acquisition target indicate the effect of expanded bank information.

Our main variable of interest—out-of-state loans—is captured in two formats. First, we use a dummy variable that indicates the existence of out-of-state loans within the past three years. Second, we use the dollar amount of out-of-state loans in the past three years. The first measure reflects the existence of a lending relationship through which the private information of the borrower is conveyed to its bank. The second measure reflects the economic incentives for banks to collect private information. A three-year period has been chosen to allow sufficient time for private information to be learned by other firms.  $\alpha_i$  is a set of state dummies, and  $\alpha_t$  is a set of year dummies. Based on the existing takeover literature,  $X_{kt}$  is a set of firm characteristics that can influence a firm's probability of becoming a target, including the logarithm of assets, market-to-book value of assets, book leverage, return on assets, tangibility, annual sales growth, cash and short-term investments-to-assets ratio, and credit rating. The definitions of these variables can be found in the Appendix. We also control dummy variables of industry merger waves (Harford 2005).

Table 4 shows the results of the multinomial logistic regressions using different control groups. Specifically, Columns 1 and 2 use all firms in Compustat as control groups; Columns 3 and 4 use firms that belong to the same size decile and four-digit SIC industry of the target firms as the control group (size-industry matched sample); and Columns 5 and 6 use propensity-score-

matched firms as control groups. For the propensity score match, we start with the size-industry matched sample and estimate a firm's probability of getting an out-of-state loan on a set of firm characteristics, including logarithm of assets, market-to-book value of assets, book leverage, return on assets, tangibility, annual sales growth, and cash and short-term investments-to-assets ratio. Finally, firms are matched using Leuven and Sianesi's (2003) propensity-score-matching procedure (at the nearest neighborhood caliper of 0.1).

We find that, the coefficients on the out-of-state loan dummy variable and the dollar amount of out-of-state loans are both statistically significantly at 1% level for firms getting out-of-state acquisition bids and insignificantly for those getting within-state acquisition bids. Using the full Compustat firms as control group, we find that firms with out-of-state loans are 1.279 times more likely of becoming a cross-state target, compared with those with no out-of-state loans. The odds increase to 1.293 and 1.473 if we use a size-industry-matched sample and a propensity-score-matched sample as control groups. Likewise, the coefficient on the dollar amount of out-of-state loans implies that if a firm increases the amount of its loan by one standard derivation, the multinomial log-odds for the firm to obtain an out-of-state acquisitions bid is expected to increase to 1.30 ( $1.059 \times 1.24$ ) unit, while holding all other variables in the model at the mean level. These results are robust in a size-industry-matched sample and a propensity-score-matched sample, suggesting that the impact of bank information through cross-state lending on a firm's likelihood of becoming a cross-state acquisition target is insensitive to our selection of control groups.

Firm-level data further allow us to directly observe whether acquirers learn invaluable information from their local banks, which have out-of-state banking business, and use such information to identify potential out-of-state targets. Specifically, conditional on the existence of

out-of-state loans in a target firm, we calculate the likelihood of the target being purchased by an acquirer from the bank's headquarter state to be 16.7%<sup>6</sup> and the likelihood of the target being purchased by an acquirer from any state to be 2%<sup>7</sup>. These results suggest that bank information does provide important guidance for local firms to make acquisitions across state borders.

## 5.2 Bank mergers and firm acquisitions

In this section, we examine the impact of bank asset acquisitions on firms' likelihood of becoming a cross-state acquisition target. Bank asset acquisition leads to a spike of banks' information on the foreign states. Importantly, such information expansion is independent of potentially unobservable characteristics of borrowers (e.g., investment opportunities or managerial talent).

We first focus on a group of firms (treatment group) whose lead banks are entirely acquired by out-of-state banks after deregulation. Our control group includes firms of the same size decile and state as the treated firms, but whose lead banks have not yet been acquired or have never been acquired in our sample period. We again estimate a difference-in-differences model: the difference in cross-state acquisitions in the treatment groups before and after the event (i.e., cross-state bank merger), compared with the difference in the control groups during the same period.

The difference-in-differences estimator is subject to a number of limitations. The estimation is consistent only if the differences not due to deregulation—in firm's cross-state acquisitions between the treated and the control groups—remain constant over time (parallel

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<sup>6</sup> The total number of out-of-state acquirers whose targets borrowed out-of-state loans is 78, and 13 of these acquirers are from the home states of the targets' out-of-state banks. Therefore, the possibility for a firm to acquire its local bank's out-of-state client is  $13/78=16.7\%$ .

<sup>7</sup> Assuming that an acquirer is equally likely to choose its target from any state, we would expect that the probability of an acquirer purchases a target from a specific state is  $1/48=2\%$ . (We have forty-eight states in our sample).

tendency). Another concern is that corporate acquisition decisions could influence the passage of interstate bank deregulation (reverse causality). For example, the need for firms to acquire outside their home state might induce local firms to lobby for an early start to interstate bank deregulation. However, the previously discussed Figures 1 and 2 suggest that the parallel tendency before deregulation is met and the reverse causality is unlikely.

Parallel tendency is satisfied by carefully choosing control group with firms similar to the firms in the treatment group before the event. Reverse causality is unlikely because a bank merger is unlikely to be the decision made by the borrowing firms. Our regression is as the following:

$$\text{Prob (target)}_{kit} = \alpha_i + \alpha_{t-1} + \beta \text{ Dummy: post-bank merger}_{kt} + \gamma X_{kt-1} + \varepsilon_{kt-1}, \quad (6)$$

where the post-bank merger dummy is an indicator variable that equals one if the firm's lead bank has been acquired by an out-of-state bank before year  $t$  and zero otherwise. Like before, we use  $i$  to indicate state,  $k$  to indicate firms, and  $t$  to indicate years.

Table 5 reports the results of this test. The coefficient of post-bank merger dummy is statistically significant at the 1% level in determining a firm's probability of obtaining an out-of-state bid and is insignificant for within-state bids. The coefficient indicates that, after a firm's lead bank is acquired by an out-of-state bank, the firm's odds of obtaining out-of-state acquisition bids increases by 2.583 times ( $p < 0.05$ , Column 2) more than the control groups, and the odds of obtaining within-state acquisition bids are not significantly different from those of the control group.

### **5.3 Acquirers and their banks**

If banks' expanded information reduces the informational problems for banks' existing clients in their investments, as banks stretch out their information boundaries through asset acquisitions in other states, the banks' clients should be more likely to acquire firms in other states. Consequently, a firm in a state with more out-of-state bank exposure will obtain more acquisition bids from firms outside of the state. Therefore, even for a firm with no lending relationship with out-of-state banks, its probability of becoming a cross-state merger and acquisitions target increases after deregulation.

To test this specific channel of information, we test the following model:

$$\text{Prob (acquirer)}_{kit} = \alpha_i + \alpha_{t-1} + \beta \text{ Dummy: loans from geographically diversified banks}_{kt-1} + \gamma X_{kt-1} + \varepsilon_{kt-1}. \quad (7)$$

The dependent variable is a categorical variable that indicates whether a firm is an acquirer in acquisitions. It equals two if the firm is an acquirer in a cross-state acquisition, equals one if the firm is an acquirer in a within-state acquisition, and equals zero if the firm does not make any acquisitions in the year. "Dummy: Bank loans" is an indicator variable that equals one if the firm has syndicate loan outstanding and zero otherwise. "Dummy: Loans with geographically diversified banks" equals 1 if the firm obtains a loan from a geographically diversified banks and zero otherwise.

Table 8 reports our estimation of Equation (7). The existence of bank loans statistically increases a firm's probability to make both within-state and cross-state acquisition bids. However, if a firm borrows from a bank with assets in other states, it is much more likely to bid for an out-of-state target, but not for a within-state target. The odds of becoming an out-of-state acquirer for firms with a loan from geographically diversified banks are 2.175 ( $p < 0.01$ , Column 6) times of those with no such loans.

## **6. Bank deregulation and asymmetric information**

If interstate banking activities alleviate information asymmetry for cross-state acquisitions, firms subject to asymmetric information problems should be more likely targeted in cross-state acquisitions after deregulation. In this section, we test Hypotheses 3a and 3b to further support our argument that the improve information environment after interstate bank deregulation is one important driver of increased cross-state acquisitions.

### **6.1 The distance between the target and the acquirer**

Our hypothesis 3 states that if interstate bank deregulation and interstate banking activities provide critical information on firms located in other states, firms in states that are open to banks from other states should be more likely acquired by firms geographically farther away.

We again apply difference-in-differences and instrument variable approaches to examine the impact of interstate bank deregulation on the distance between acquirers and targets. Table 7 reports the results. We find that the distance between acquirers and targets increases significantly after interstate bank deregulation. Figure 4 shows that the distance between acquirers and targets keep on expanding after the deregulation, consistent with the increased pattern of loans over time (Panel B of Figure 1). Our two-stage least square regressions confirm our finding and confirms that the bank integration is the reason behind the expansion of firm boundaries. The economic impact of bank integration is quite large. One-standard increase in the ratio of bank assets in state  $j$  acquired by other states increases the distance between acquirers and targets by 1,020 miles.

To visualize our findings, in Figure 5 we plot the cross-state acquisitions two years before and two years after deregulation for three representative states from the West Coast, the Midwest, and the East Coast. After deregulation, out-of-state acquirers in the three representative states from each geographic area indeed come from states geographically farther away.

## **6.2 Which Firms Are Likely Targeted after Deregulation?**

The results, so far, are consistent with the argument that banks' information has important externalities on corporate acquisitions. If interstate banking activities reduce asymmetric information between acquirers and targets from different states, cross-state loans should have the largest impact on firms with more information opacity. To test this hypothesis, we start with a univariate analysis by comparing firm characteristics of public targets and their public out-of-state acquirers before and after the targets' states passed interstate bank deregulation. Table 6 reports our results. We find that, after deregulation, more young firms and firms with high market-to-book, low profitability (Return on assets), high volatility of ROA, and low tangible assets become the cross-state acquisition targets. It appears that firms subject to more information problems are more likely targeted in cross-state acquisitions after deregulation.

Next, we re-estimate Equation (5) for the subsample of firms with different levels of information opacity. In particular, we test whether out-of-state loans have a stronger impact on a firm's likelihood of being acquired by out-of-state acquirers if these firms are unrated, smaller, and younger. We present these estimates in Table 7. For firms with no credit ratings (smaller sizes/younger ages), both the existence of an out-of-state loan and the size of the loan significantly increase their likelihoods of being targets by acquirers from outside of the state. However, such an effect does not exist for firms with credit ratings (larger sizes/older ages). These results suggest that the alleviated information asymmetry through interstate banking activities is mostly concentrated within firms that have more informational problems.

## **7. Cumulative Abnormal Returns**

Our final hypothesis states that the stock markets should more positively respond to acquirers' acquisition announcements after deregulation, if banks' expanded information, due to

deregulation, helps firms better identify acquisition targets with higher synergies. To test this hypothesis, we compare the stock market's reaction to the acquisition announcement before and after interstate bank deregulation. For acquisitions announced in different deregulation status, we compute the cumulative market-adjusted returns around the announcements for different event windows.<sup>8</sup> Deregulation status is a vector of two dummy variables [Deregulation in acquirer's state, Deregulation in target's state]. For example, Deregulation status [0, 1] means that, at the time of the cross-state acquisition, the acquirer's state was not deregulated (0), but the target's state was deregulated (1).

In Panel A of Table 10, we show that the average announcement returns for out-of-state acquirers increases by 1.2% after the acquirer and target states are both deregulated. Considering that the mean cumulative abnormal return for acquirers are typically close to zero, the increased return is considerably large (see Andrade, Mitchell and Stafford 2001 for a summary of acquirer returns documented in the literature). This result is, at least, partially driven by the fact that more private firms are targeted after deregulation. The literature has shown that acquirers of private targets tend to show higher returns (e.g., Chang 1998). However, in Panel B we find that, within acquisitions of private targets, the acquirer's returns are significantly increased after deregulation. Specifically, we find that the average announcement returns of acquirers increase by 1.4% for acquirers if they bid for private target, whereas there is no significant change in acquirers' announcement return across difference deregulation status if they bid for public targets. Therefore, better information, due to a more efficient and competitive banking sector, helps acquirers choose targets with high synergies that are difficult to recognize because of information obstacles.

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<sup>8</sup>Because of space limitations, we only report the results for event window [-2, 2]. However, using event window [-1, 1] and [-5, 5], we obtain qualitatively similar results.

More interestingly, in Panel C of Table 10, we compare acquirer returns of cross-state acquisitions and those of within-state acquisitions between different deregulation statuses. The clear pattern is that, post-deregulation, the announcement returns only increase for acquirers of cross-state acquisitions, but not for within-state acquisitions. Pre-deregulation, the acquirer returns of within-state acquisitions are significantly higher than those of cross-state acquisitions. However, this difference in returns disappears after deregulation. This evidence is consistent with the notion that alleviated information asymmetry in the economy after deregulation improves the outcomes for investments subject to more informational problems.

## **8. Alternative Explanations**

We have provided a series of strong and robust results that highlight the importance of bank information in cross-state acquisitions. In this section, we address the possibility of alternative explanations for our findings.

Besides our information channel, the increased credit supply, due to deregulation, can make local firms more attractive takeover targets for out-of-state acquirers for two reasons. First, firms within the state can take advantage of the increased credit supply after deregulation to nurture new projects and increase their overall quality as takeover targets. However, if our results are driven by this argument, out-of-state acquirers should not be concentrated within certain states. Instead, we have shown that out-of-state acquirers are much more likely to come from the same states as the targets' out-of-state banks. Moreover, since relieving financial constraint is a critical motivation for targets in takeovers, firms post-deregulation should be less willing to sell because of their improved access to external finance (Officer 2007; Erel, Jang, and Weisbach 2015). Together, the increased cross-state acquisitions after deregulation are less likely explained by increased firm quality following deregulation.

Second, financially constrained acquirers from other states may want to acquire firms in the deregulated states to take advantage of increased credit supply. We argue that this alternative hypothesis is also unlikely. Since we document that most cross-state acquisition targets have already borrowed out-of-state loans after deregulation, the little debt capacity left for potential acquirers should not be enough to motivate cross-state acquisitions.

## **9. Conclusion**

Using staggered interstate bank deregulation in the US during the 1980s and 1990s as an exogenous expansion to banks' information boundaries, we show that a competitive banking sector reduces the informational problems for the real economy and provides useful guidance for corporate investment. We find that firms within states that allow interstate banking activities are more likely to be identified as targets by acquirers from other states. In particular, as firms obtain out-of-state loans after interstate bank deregulation, the likelihood of being acquired by a bidder from another state increases by 47.3% (significant at 1% level). This effect is stronger for firms subject to more asymmetric information, such as younger, smaller, unrated, and not-publicly-traded firms.

We interpret these results as evidence that the interstate banking activities enable banks to acquire information about out-of-state borrowers and transmit it to potential acquirers. Our study uncovers a new dimension of the special role played by banks as informational hubs in the capital markets. Our results strongly suggest that the information produced by banks in the lending process, especially in the case of firms plagued by asymmetric information, leads to more and a higher number of value-increasing acquisitions among nonfinancial firms. Whether or not expanded bank information can lead to more efficient corporate investments, in general, will need to be explored in future research.

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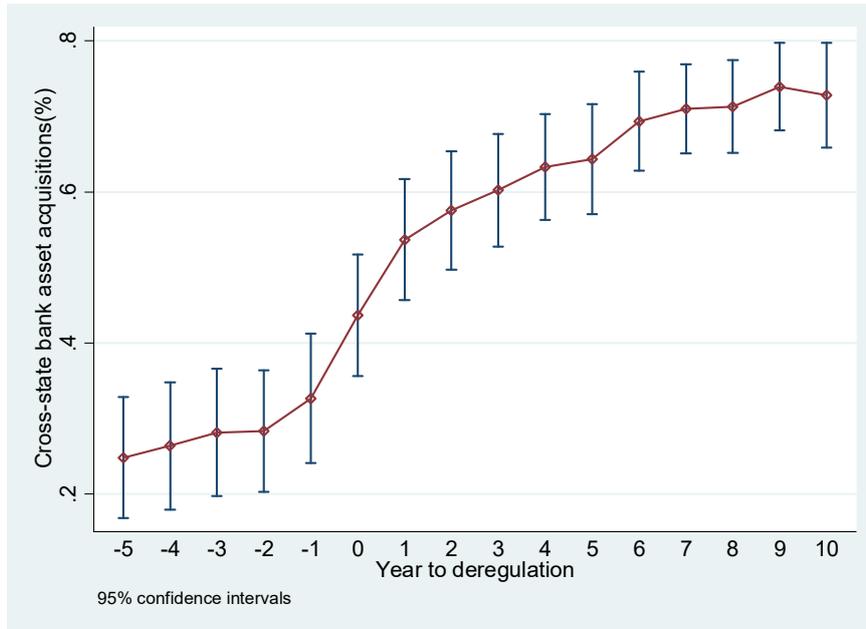
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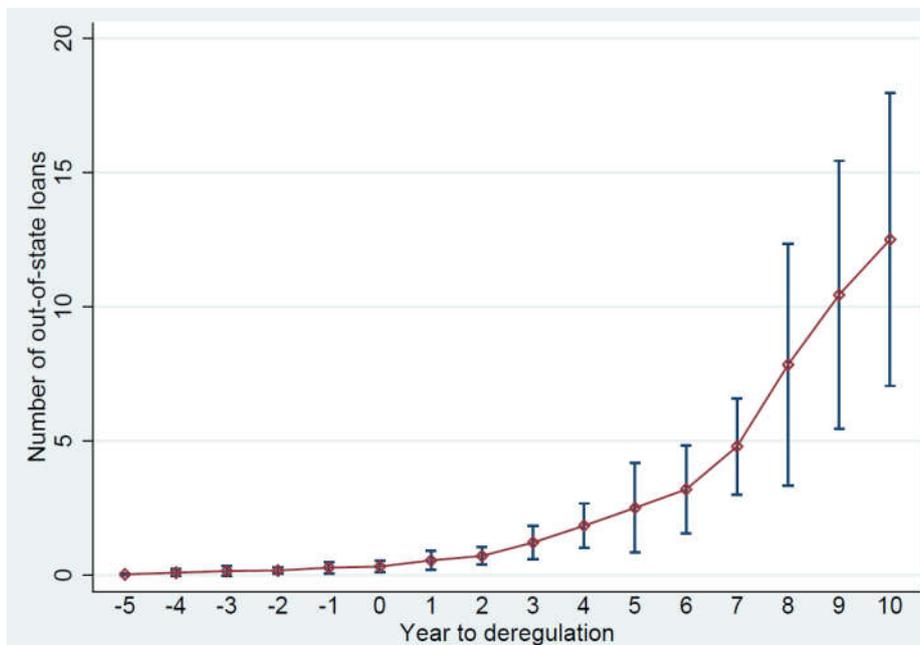
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Figure 1. Impact of interstate bank deregulation on out-of-state loans and cross-state bank asset acquisitions

Plot of the time profile of the average value of bank assets acquired by banks from other states in a state (A). Plot of the time profile of the average number of out-of-state loans in a state (B). Year 0 indicates the year of interstate bank deregulation.



(A)



(B)

Figure 2. Interstate bank deregulation and number of acquisitions: Cross state versus within state

This figure plots the time profile of the average number of firms in a state that become acquisition targets in cross-state acquisitions and within-state acquisitions, respectively. Year 0 indicates the year of interstate bank deregulation.

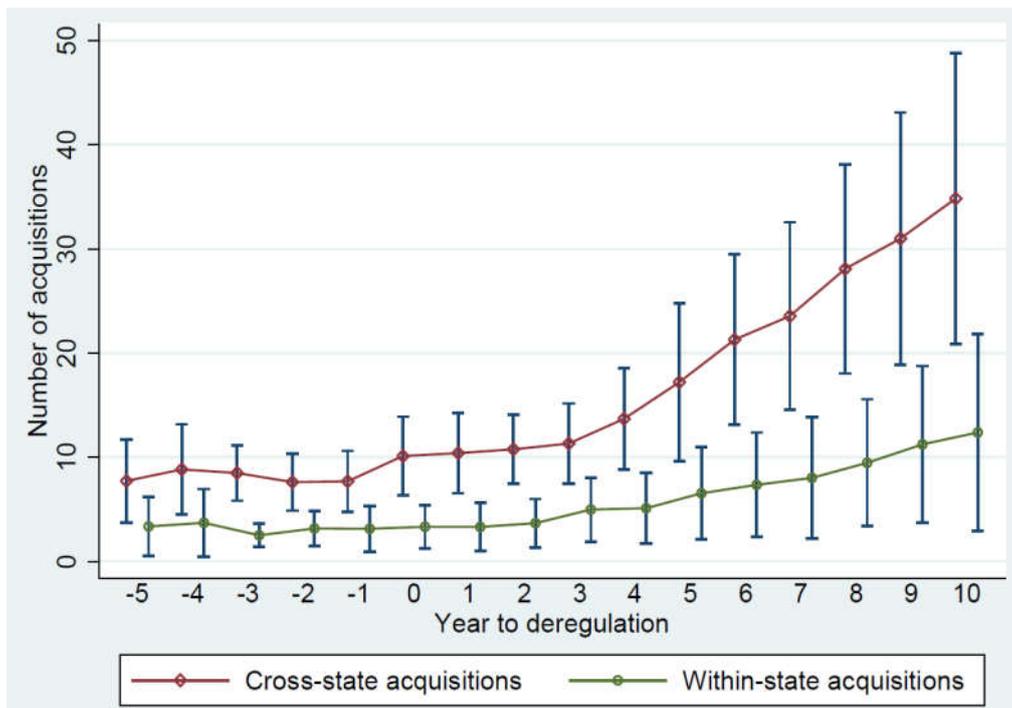


Figure 3. Distribution of  $t$ -statistics from 500 simulations of fictitious deregulations

This figure shows the histograms of the  $t$ -statistics for “deregulated dummy” (left) and “deregulated year” (right) from Table 2 from 500 simulations of fictitious deregulations to each state. Kernel density estimates are imposed on top of the histograms.

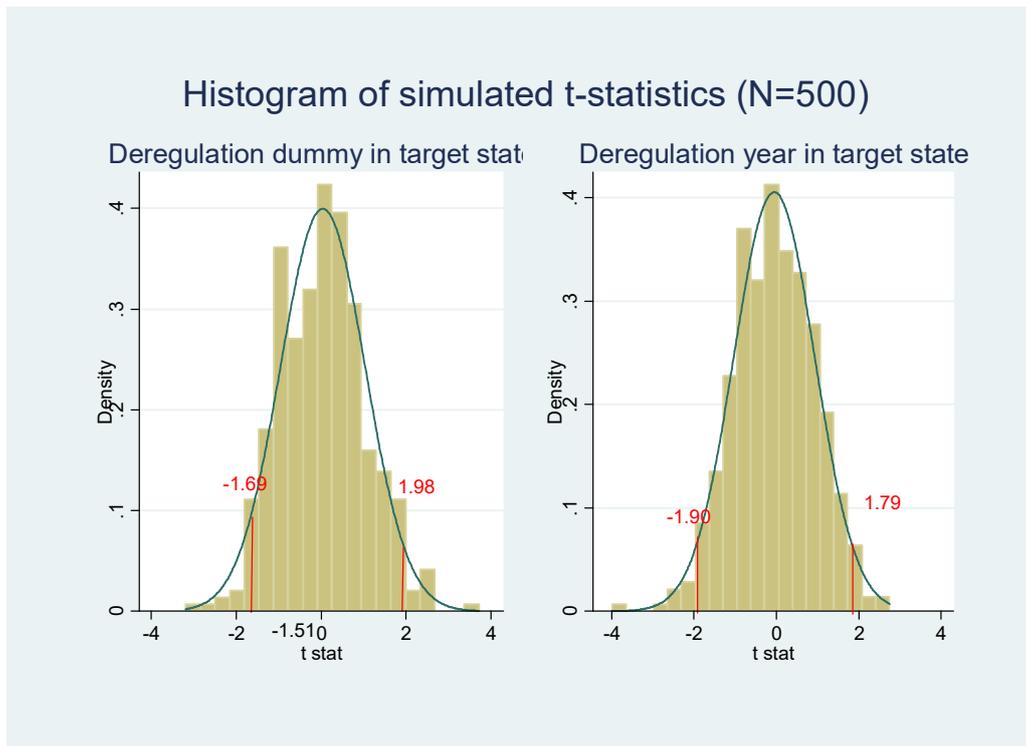


Figure 4 The distance between acquires and targets

This figure plots the time profile of the mean (median) of the distance from all the acquirers to targets in state  $j$ . Year 0 indicates the year of interstate bank deregulation.

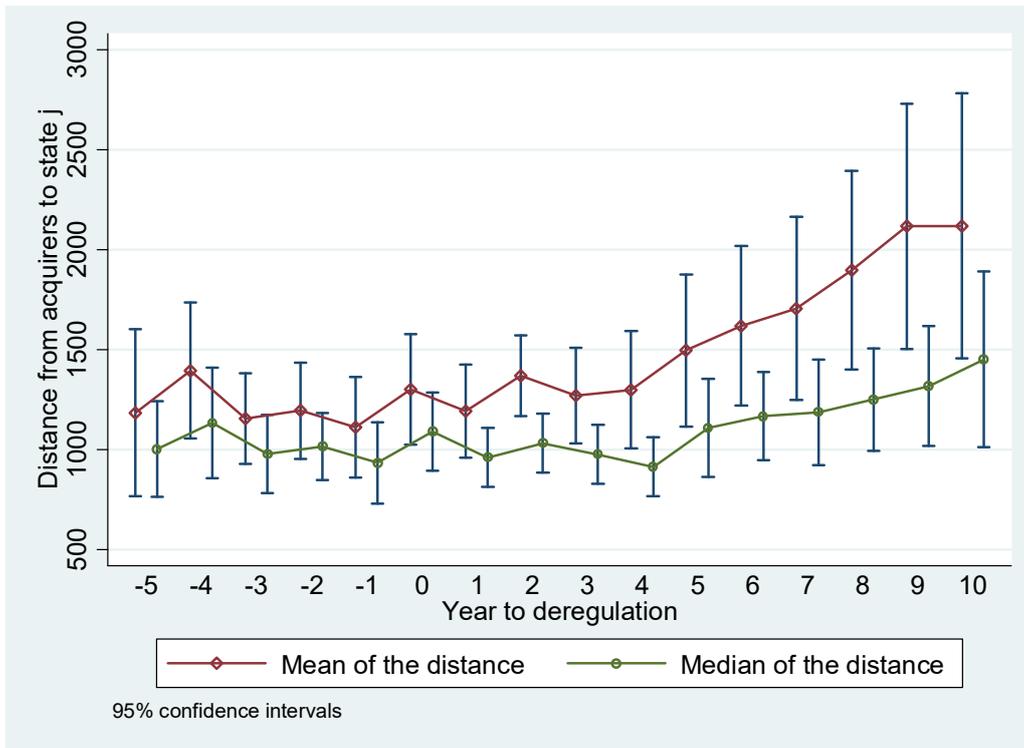
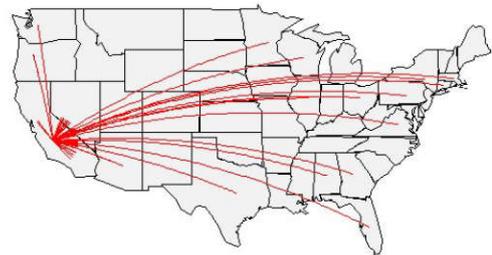
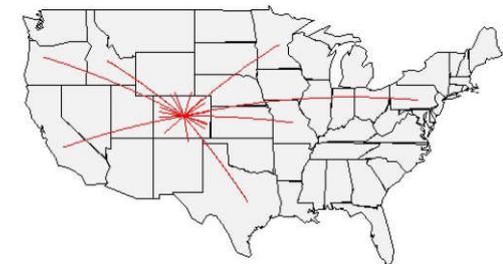


Figure 5. Examples: Firms in a state as targets in cross-state acquisitions: Pre-deregulation versus post-deregulation

Left: The out-of-state acquirers of firms in each state two years before interstate bank deregulation in acquirers' and targets' states. Right: The out-of-state acquirers of firms in each state two years after interstate bank deregulation in acquirers' and targets' states.



(A) Target state: California



(B) Target state: Colorado



(C) Target state: Pennsylvania

Table 1. Sample description

Panel A reports summary statistics for out-of-state loans, bank asset acquisitions, bank mergers, and firm acquisitions for the state-year. Panel B compares firm characteristics of from the Compustat sample, borrowers of out-of-state loans, targets of cross-state acquisitions, and acquirers of cross-state acquisitions. The sample includes state-year observations (Panel A) or firm observations (Panel B) from 1981 to 2000. All variables are winsorized at the 1st and 99th percentiles of their distributions. Detailed definitions of variables can be found in Appendix A.

| <i>Panel A. State-year statistics</i>                   |       |        |          |        |          |       |
|---|-------|--------|----------|--------|----------|-------|
|   | p25   | Median | Mean     | p75    | SD       | Obs   |
| <b><i>Out-of-state loans</i></b>                        |       |        |          |        |          |       |
| Number of out-of-state loans                            | 0.00  | 0.00   | 4.21     | 0.00   | 23.47    | 1,176 |
| Value of out-of-state loans (in millions)               | 0.00  | 0.00   | 1,272.22 | 0.00   | 9339.67  | 1,176 |
| <b><i>Bank asset acquisitions</i></b>                   |       |        |          |        |          |       |
| Bank assets in state $j$ acquired by other states (%)   | 0.16  | .50    | 0.48     | 0.78   | 0.33     | 1176  |
| <b><i>Bank mergers</i></b>                              |       |        |          |        |          |       |
| Number of bank mergers and acquisitions                 | 0.00  | 2.00   | 2.98     | 4.00   | 5.86     | 905   |
| Number of bank holding company mergers and acquisitions | 2.00  | 2.00   | 4.90     | 6.00   | 8.09     | 682   |
| <b><i>Firm acquisitions</i></b>                         |       |        |          |        |          |       |
| Number of firm acquisitions                             | 0.00  | 0.00   | 7.12     | 8.00   | 17.19    | 1,176 |
| Value of firm acquisitions (in millions)                | 0.00  | 0.00   | 904.32   | 415.47 | 4,693.29 | 1,176 |
| Average deal value of firm acquisitions (in millions)   | 25.95 | 48.62  | 112.67   | 117.54 | 367.44   | 557   |

*Panel B. Firm characteristics*

|   | p25   | Median | Mean | p75  | SD    | Obs.   |
|---|-------|--------|------|------|-------|--------|
| <b><i>Compustat sample</i></b>                |       |        |      |      |       |        |
| Log(Assets)                                   | 2.21  | 3.74   | 3.85 | 5.33 | 2.27  | 80,373 |
| Market-to-book                                | 0.74  | 1.03   | 2.03 | 1.72 | 4.80  | 62,719 |
| Book leverage                                 | 0.07  | 0.23   | 0.26 | 0.40 | 0.22  | 80,373 |
| Return on assets                              | 0.01  | 0.11   | 0.03 | 0.18 | 0.60  | 79,829 |
| Tangibility                                   | 0.13  | 0.26   | 0.32 | 0.46 | 0.24  | 80,201 |
| Sales growth                                  | -0.03 | 0.09   | 1.03 | 0.28 | 41.90 | 71,321 |
| Cash  | 0.02  | 0.07   | 0.15 | 0.21 | 0.22  | 80,363 |
| Credit rating                                 | 1.00  | 1.00   | 1.17 | 1.00 | 0.50  | 80,116 |
| <b><i>Borrowers of out-of-state loans</i></b> |       |        |      |      |       |        |
| Log(Assets)                                   | 5.72  | 6.77   | 6.79 | 7.89 | 1.63  | 1,135  |
| Market-to-book                                | 0.98  | 1.23   | 2.00 | 1.83 | 3.60  | 1,021  |
| Book leverage                                 | 0.19  | 0.30   | 0.32 | 0.42 | 0.19  | 1,135  |
| Return on assets                              | 0.09  | 0.14   | 0.13 | 0.18 | 0.12  | 1,131  |
| Tangibility                                   | 0.20  | 0.34   | 0.38 | 0.53 | 0.23  | 1,133  |
| Sales growth                                  | 0.02  | 0.10   | 1.83 | 0.25 | 55.16 | 1,116  |
| Cash  | 0.01  | 0.03   | 0.07 | 0.08 | 0.09  | 1,134  |
| Credit rating                                 | 1.00  | 2.00   | 1.80 | 3.00 | 0.86  | 1,129  |
| <b><i>Public targets</i></b>                  |       |        |      |      |       |        |
| Log(Assets)                                   | 3.02  | 4.12   | 4.20 | 5.28 | 1.72  | 1,470  |
| Market-to-book                                | 0.78  | 1.08   | 2.23 | 1.70 | 10.68 | 1,319  |
| Book leverage                                 | 0.07  | 0.23   | 0.27 | 0.41 | 0.22  | 1,470  |
| Return on assets                              | 0.03  | 0.11   | 0.07 | 0.17 | 0.24  | 1,464  |
| Tangibility                                   | 0.13  | 0.26   | 0.32 | 0.46 | 0.23  | 1,469  |
| Sales growth                                  | -0.01 | 0.11   | 0.34 | 0.30 | 2.03  | 1,389  |
| Cash  | 0.02  | 0.07   | 0.14 | 0.19 | 0.18  | 1,470  |
| Credit rating                                 | 1.00  | 1.00   | 1.14 | 1.00 | 0.42  | 1,468  |
| <b><i>Public acquirers</i></b>                |       |        |      |      |       |        |
| Log(Assets)                                   | 3.56  | 4.82   | 4.96 | 6.29 | 2.04  | 4,485  |
| Market-to-book                                | 0.91  | 1.29   | 2.77 | 2.36 | 6.49  | 3,913  |
| Book leverage                                 | 0.07  | 0.22   | 0.26 | 0.38 | 0.26  | 4,467  |
| Return on assets                              | 0.08  | 0.14   | 0.12 | 0.20 | 0.21  | 4,455  |
| Tangibility                                   | 0.12  | 0.25   | 0.31 | 0.44 | 0.23  | 4,474  |
| Sales growth                                  | 0.04  | 0.17   | 0.69 | 0.41 | 6.69  | 3,918  |
| Cash  | 0.02  | 0.07   | 0.15 | 0.22 | 0.19  | 4,482  |
| Credit rating                                 | 1.00  | 1.00   | 1.30 | 1.00 | 0.65  | 4,474  |

Table 2. Interstate bank deregulation and cross-state acquisitions: State-level analysis

This table reports the difference-in-differences and two-stage least square estimates for the number of cross-state acquisitions in state  $j$ . The sample includes all the state-year observations from five years before interstate bank deregulation to ten years after deregulation from 1981 to 2000. “Deregulation dummy $_j$ ” equals one if state  $j$  is deregulated to all the other states in a year, and 0 otherwise. “Deregulated years $_j$ ” is the number of years since deregulation for state  $j$ . Degree of deregulation $_{jt}$  and Weighted degree of deregulation $_{jt}$  are defined in Section 3.2. “Bank integration” is the percentage of bank assets in the state  $j$  owned by banks in other states, based on the data on bank holding company (BHC) structures in bank call reports as in Morgan, Rime, and Strahan (2004). GSP $_{jt}$  is the measurement of the economic output of a state  $j$  in year  $t$ . It is the sum of all value added by industries within the state and serves as a counterpart to the gross domestic product (GDP). GSP growth $_{jt}$  is the growth rate of GSP at state  $j$  in year  $t$ . Within-state banking industry HHI $_{jt}$  is the Herfindahl-Hirschman index of the banking industry in state  $j$  at year  $t$ . Pre-deregulation banking industry HHI $_j$  the Herfindahl-Hirschman index of the banking industry in state  $j$  one year before it deregulates. All specifications include state fixed effects, year fixed effects, and anti-takeover law fixed effects. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables  | Log(Number of cross-state acquisitions <sub>jt</sub> +1) |                    |                    |                    |                     |                      |
|--|--|--------------------|--------------------|--------------------|---------------------|----------------------|
|  | Diff-in-Diff   |                    | Triple-Diff        |                    | 2SLS<br>First stage | 2SLS<br>Second stage |
|  | (1)  | (2)                | (3)                | (4)                | (5)                 | (6)                  |
| Deregulation dummy <sub>jt</sub> : Target state                                      | 0.0536<br>(0.87)   |                    |                    | -0.100<br>(-1.48)  | 0.1003***<br>(3.61) |                      |
| Deregulated years <sub>jt</sub> : Target state                                       | 0.0481***<br>(3.36)                                      |                    |                    |                    | 0.0172***<br>(2.94) |                      |
| Degree of deregulation <sub>jt</sub>   |  | 0.0795**<br>(2.16) |                    |                    |                     |                      |
| Weighted degree of deregulation <sub>jt</sub>  |  |                    | 0.2301*<br>(1.75)  |                    |                     |                      |
| Within-state banking industry HHI <sub>jt</sub>                                      | -0.1592<br>(-0.84)                                       | -0.0102<br>(-0.05) | -0.0696<br>(-0.37) | -0.105<br>(-0.57)  |                     | -0.6715**<br>(-2.15) |
| Deregulated dummy <sub>jt</sub> × Pre-deregulation banking industry HHI <sub>j</sub> |  |                    |                    | 2.262***<br>(4.78) |                     |                      |
| GSP <sub>jt</sub>  | 0.0179<br>(0.35)   | 0.0482<br>(0.94)   |                    | 0.024<br>(0.47)    |                     | 0.0458<br>(0.56)     |
| GSP growth <sub>jt</sub>   | 0.1447<br>(1.45)   | 0.1369<br>(1.36)   |                    | 0.129<br>(1.31)    |                     | 0.1503<br>(1.33)     |
| Bank integration <sub>jt</sub>   |  |                    |                    |                    |                     | 1.4386***<br>(2.87)  |
| Constant   | -0.0322<br>(-0.17)                                       | -0.1472<br>(-0.81) | -0.0890<br>(-0.49) | 0.113<br>(0.65)    | 0.1167<br>(1.17)    | 0.7740***<br>(2.93)  |
| Observations   | 905  | 905                | 925                | 905                | 905                 | 905                  |
| State FE   | Yes  | Yes                | Yes                | Yes                | Yes                 | Yes                  |
| Year FE  | Yes  | Yes                | Yes                | Yes                | Yes                 | Yes                  |
| Antitakeover FE  | Yes  | Yes                | Yes                | Yes                | Yes                 | Yes                  |
| R-squared  | 0.902  | 0.900              | 0.898              | 0.904              |                     | 0.851                |
| F-statistics   |  |                    |                    |                    | 70.89               |                      |

Table 3 Interstate bank deregulation and out-of-state loans

This table reports the two-stage least square estimates for the number of cross-state acquisitions in state  $j$ . The sample includes all the state-year observations from five years before interstate bank deregulation to ten years after deregulation from 1981 to 2000. “Deregulation dummy $j$ ” equals one if state  $j$  is deregulated to all the other states in a year, and 0 otherwise. “Deregulated years $j$ ” is the number of years since deregulation for state  $j$ . Degree of deregulation $_{jt}$  and Weighted degree of deregulation $_{jt}$  are defined in Section 3.2. “Bank integration” is the percentage of bank assets in the state  $j$  owned by banks in other states, based on the data on bank holding company (BHC) structures in bank call reports as in Morgan, Rime, and Strahan (2004). GSP $_{jt}$  is the measurement of the economic output of a state  $j$  in year  $t$ . It is the sum of all value added by industries within the state and serves as a counterpart to the gross domestic product (GDP). GSP growth $_{jt}$  is the growth rate of GSP at state  $j$  in year  $t$ . Within-state banking industry HHI $_{jt}$  is the Herfindahl-Hirschman index of the banking industry in state  $j$  at year  $t$ . Degree of deregulation $_{jt}$  and Weighted degree of deregulation $_{jt}$  are defined in Section 3.2. “Bank integration” is the percentage of bank assets in the state  $j$  owned by banks in other states, based on the data on bank holding company (BHC) structures in bank call reports as in Morgan, Rime, and Strahan (2004). GSP $_{jt}$  is the measurement of the economic output of a state  $j$  in year  $t$ . It is the sum of all value added by industries within the state and serves as a counterpart to the gross domestic product (GDP). GSP growth $_{jt}$  is the growth rate of GSP at state  $j$  in year  $t$ . Within-state banking industry HHI $_{jt}$  is the Herfindahl-Hirschman index of the banking industry in state  $j$  at year  $t$ . All specifications include state fixed effects, year fixed effects, and anti-takeover law fixed effects. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables                                       | (1)<br>2SLS First stage<br>Bank integration <sub>jt</sub> | (2)<br>2SLS Second stage<br>Log (Number of out-of-state<br>loans <sub>jt</sub> + 1) |
|---|---|---|
| Bank integration <sub>jt</sub>                  |   | 0.0439**<br>(2.02)  |
| Deregulation dummy <sub>jt</sub> : Target state | 0.2328<br>(0.15)  |   |
| Deregulated years <sub>jt</sub> : Target state  | 1.5723***<br>(2.63)                                       |   |
| Banking industry HHI <sub>jt</sub>              |   | -0.9749<br>(-1.47)  |
| GSP <sub>jt</sub>                               |   | -0.0000<br>(-0.26)  |
| GSP growth <sub>jt</sub>                        |   | -0.4187<br>(-1.49)  |
| Constant  | -22.0595**<br>(-2.23)                                     | 0.9469***<br>(2.75)   |
| Observations                                    | 679   | 679   |
| State FE  | Yes   | Yes   |
| Year FE   | Yes   | Yes   |
| Antitakeover FE                                 | Yes   | Yes   |
| R-squared                                       |   | 0.604   |
| F-statistics                                    | 16.22   |   |

Table 4. A firm's probability of being a cross-state acquisition target

This table reports the odd ratios and *t*-statistics (in parentheses) of multinomial logistic regressions that estimate the probability of becoming a target. The sample includes all firm-year observations from five years before the interstate bank deregulation to ten years after deregulation from 1981 to 2000. The dependent variable is a categorical variable that indicates whether a firm is an acquisition target. It equals two if the firm is a cross-state acquisition target, equals one if the firm is a within-state acquisition target, and zero if the firm remains independent. Our baseline outcome is that firms remain independent. Columns 1–4 include all firms in Compustat; Columns 5–8 use firms within same size decile and industry as the control group; and Columns 9–12 use propensity-score-matched firms as control groups. “Dummy: out-of-state loan” equals one if the firm has borrowed from out-of-state banks in the past three years and zero otherwise. “Size of out-of-state loan” is the total dollar amount borrowed by the firm from out-of-state banks in the past three years. All specifications include state fixed effects, year fixed effects, and merger wave fixed effects. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables                       | Probability (target) |                     |                     |                     |                     |                     |                     |                     |                     |                     |                      |                     |
|---------------------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
|                                 | Full sample          |                     |                     |                     | Matched sample      |                     |                     |                     | PS-matched sample   |                     |                      |                     |
|                                 | Within state<br>(1)  | Cross-state<br>(2)  | Within state<br>(3) | Cross-state<br>(4)  | Within state<br>(5) | Cross-state<br>(6)  | Within state<br>(7) | Cross-state<br>(8)  | Within state<br>(9) | Cross-state<br>(10) | Within state<br>(11) | Cross-state<br>(12) |
| Dummy: Out-of-state loan        | 1.004<br>(0.02)      | 1.279*<br>(1.86)    |                     |                     | 0.963<br>(-0.15)    | 1.293*<br>(1.87)    |                     |                     | 1.504<br>(1.08)     | 1.473**<br>(1.98)   |                      |                     |
| Log (Size of out-of-state loan) |                      |                     | 1.038<br>(0.97)     | 1.059***<br>(2.85)  |                     |                     | 1.041<br>(0.99)     | 1.076***<br>(3.34)  |                     |                     | 1.156*<br>(1.82)     | 1.065*<br>(1.67)    |
| Log (Assets)                    | 1.007<br>(0.22)      | 1.056***<br>(3.03)  | 1.001<br>(0.02)     | 1.050***<br>(2.67)  | 0.963<br>(-0.81)    | 0.977<br>(-0.88)    | 0.953<br>(-1.01)    | 0.964<br>(-1.35)    | 0.888<br>(-0.84)    | 0.966<br>(-0.47)    | 0.806<br>(-1.37)     | 0.948<br>(-0.68)    |
| Market-to-book                  | 0.994<br>(-0.43)     | 1.007<br>(1.47)     | 0.994<br>(-0.43)    | 1.007<br>(1.47)     | 0.994<br>(-0.36)    | 1.011**<br>(2.30)   | 0.994<br>(-0.35)    | 1.011**<br>(2.31)   | 0.989<br>(-0.17)    | 0.990<br>(-0.37)    | 0.986<br>(-0.21)     | 0.990<br>(-0.37)    |
| Book leverage                   | 1.014<br>(0.57)      | 0.995<br>(-0.38)    | 1.014<br>(0.57)     | 0.995<br>(-0.38)    | 1.021<br>(0.62)     | 0.997<br>(-0.16)    | 1.021<br>(0.61)     | 0.997<br>(-0.17)    | 3.490*<br>(1.90)    | 1.917<br>(1.63)     | 3.378*<br>(1.84)     | 1.892<br>(1.60)     |
| Return on assets                | 1.231*<br>(1.70)     | 1.203*<br>(1.92)    | 1.239*<br>(1.76)    | 1.206*<br>(1.96)    | 1.195<br>(0.94)     | 1.100<br>(0.85)     | 1.195<br>(0.95)     | 1.105<br>(0.89)     | 0.513<br>(-0.58)    | 0.982<br>(-0.03)    | 0.507<br>(-0.59)     | 0.942<br>(-0.08)    |
| Tangibility                     | 2.133***<br>(3.28)   | 0.964<br>(-0.27)    | 2.129***<br>(3.27)  | 0.965<br>(-0.26)    | 2.098**<br>(2.38)   | 0.912<br>(-0.51)    | 2.115**<br>(2.41)   | 0.918<br>(-0.48)    | 1.578<br>(0.61)     | 1.724<br>(1.34)     | 1.563<br>(0.60)      | 1.735<br>(1.35)     |
| Sales growth                    | 0.999<br>(-0.20)     | 0.986<br>(-1.21)    | 0.999<br>(-0.21)    | 0.986<br>(-1.22)    | 1.000<br>(-0.12)    | 0.991<br>(-0.62)    | 1.000<br>(-0.13)    | 0.991<br>(-0.63)    | 0.983<br>(-0.15)    | 0.888<br>(-0.71)    | 0.979<br>(-0.16)     | 0.887<br>(-0.73)    |
| Cash                            | 1.640**<br>(2.11)    | 0.653**<br>(-2.44)  | 1.661**<br>(2.18)   | 0.663**<br>(-2.36)  | 2.039*<br>(1.75)    | 0.451***<br>(-3.08) | 2.140*<br>(1.87)    | 0.470***<br>(-2.92) | 0.787<br>(-0.11)    | 11.908***<br>(2.98) | 0.956<br>(-0.02)     | 13.212***<br>(3.11) |
| Credit rating                   | 0.872<br>(-1.02)     | 0.702***<br>(-4.86) | 0.852<br>(-1.17)    | 0.690***<br>(-5.06) | 0.920<br>(-0.55)    | 0.803***<br>(-2.68) | 0.899<br>(-0.70)    | 0.786***<br>(-2.93) | 0.770<br>(-0.81)    | 0.813<br>(-1.32)    | 0.784<br>(-0.76)     | 0.800<br>(-1.43)    |
| State FE                        |                      | Yes                 |                     | Yes                 |                     | Yes                 |                     | Yes                 |                     | Yes                 |                      | Yes                 |
| Year FE                         |                      | Yes                 |                     | Yes                 |                     | Yes                 |                     | Yes                 |                     | Yes                 |                      | Yes                 |
| Wave FE                         |                      | Yes                 |                     | Yes                 |                     | Yes                 |                     | Yes                 |                     | Yes                 |                      | Yes                 |
| Number of observations          | 60,553               |                     | 60,553              |                     | 32,253              |                     | 32,253              |                     | 4,215               |                     | 4,215                |                     |
| Pseudo R-squared                | 0.0283               |                     | 0.0286              |                     | 0.0417              |                     | 0.0425              |                     | 0.0194              |                     | 0.0203               |                     |

Table 5. Bank mergers and firm acquisitions

This table reports the odd ratios and *t*-statistics (in parentheses) of multinomial logistic regressions that estimate the impact of cross-state bank merger on the probability of becoming a target. The sample include all firms that borrowed from banks that are acquired by out-of-state banks after deregulation and their size-state matched firms from five years before interstate bank deregulation to ten years after deregulation from 1981–2000. The dependent variable is a categorical variable that indicates whether a firm is an acquisition target. It equals two if the firm is a cross-state acquisition target, equals one if the firm is a within-state acquisition target, and zero if the firm remains independent. Our baseline is when firms remain independent. “Dummy: Post-bank merger” equals one if the firm’s lead bank has been acquired by an out of-state-bank and zero otherwise. All specifications include state fixed effects, year fixed effects and merger wave fixed effects. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables               | Probability (target) |                    |
|-------------------------|----------------------|--------------------|
|                         | Within-state<br>(1)  | Cross-state<br>(2) |
| Dummy: Post-bank merger | 0.450<br>(-0.71)     | 2.583**<br>(2.16)  |
| Log (Assets)            | 1.772<br>(1.62)      | 1.098<br>(0.59)    |
| Market-to-book          | 1.059<br>(1.05)      | 1.041<br>(1.20)    |
| Book leverage           | 0.176<br>(-0.81)     | 3.290<br>(1.55)    |
| Return on assets        | 0.024<br>(-1.40)     | 0.271<br>(-0.66)   |
| Tangibility             | 2.385<br>(0.54)      | 0.855<br>(-0.19)   |
| Sales growth            | 0.362<br>(-1.10)     | 0.973<br>(-0.17)   |
| Cash                    | 13.325<br>(1.16)     | 0.030<br>(-1.40)   |
| Credit rating           | 0.537<br>(-0.91)     | 0.607<br>(-1.41)   |
| Year FE                 | Yes                  | Yes                |
| Wave FE                 | Yes                  | Yes                |
| Number of observations  | 1,570                | 1,570              |
| Pseudo R-squared        | 0.181                | 0.181              |

Table 6. Bank assets acquisitions and firm acquisitions

This table reports the odd ratios and *t*-statistics (in parentheses) of multinomial logistic regressions that estimate the impact of interstate bank asset acquisition on the probability of becoming an acquirer. The sample includes all firm-year observations from five years before interstate bank deregulation to ten years after deregulation from 1981 to 2000. The dependent variable is a categorical variable that indicates whether a firm is an acquirer in acquisitions. It equals two if the firm is an acquirer in a cross-state acquisition, equals one if the firm is an acquirer in a within-state acquisition, and zero if the firm does not make any acquisitions in the year. Our baseline is when a firm remains independent. “Dummy: Bank loan” equals one if the firm borrowed bank loans in the past years and zero otherwise. “Dummy: Loans from geographically diversified banks” equals one if the firm, in the past years, borrowed from banks with out-of-state assets and zero otherwise. All specifications include state fixed effects, year fixed effects and merger wave fixed effects. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables   | Probability (acquirer) |                     |                     |                     |
|---|------------------------|---------------------|---------------------|---------------------|
|   | Within state<br>(1)    | Cross-state<br>(2)  | Within state<br>(3) | Cross-state<br>(4)  |
| Dummy: Bank loans                                     | 1.301**<br>(2.17)      | 1.925***<br>(10.27) |                     |                     |
| Dummy: Loans from<br>geographically diversified banks |                        |                     | 1.307<br>(1.49)     | 2.175***<br>(8.74)  |
| Log (Assets)  | 1.178***<br>(8.58)     | 1.244***<br>(18.93) | 1.181***<br>(8.76)  | 1.253***<br>(19.62) |
| Market-to-book  | 1.020***<br>(5.21)     | 1.023***<br>(7.78)  | 1.020***<br>(5.22)  | 1.023***<br>(7.77)  |
| Book leverage   | 0.770**<br>(-2.05)     | 0.707***<br>(-4.16) | 0.773**<br>(-2.04)  | 0.721***<br>(-4.08) |
| Return on assets                                      | 2.180***<br>(5.86)     | 2.598***<br>(9.50)  | 2.184***<br>(5.88)  | 2.602***<br>(9.58)  |
| Tangibility   | 1.608***<br>(3.35)     | 0.745***<br>(-3.36) | 1.607***<br>(3.34)  | 0.743***<br>(-3.40) |
| Sales growth  | 1.000<br>(-0.63)       | 1.000<br>(0.79)     | 1.000<br>(-0.63)    | 1.000<br>(0.76)     |
| Cash  | 1.914***<br>(3.86)     | 1.514***<br>(3.82)  | 1.894***<br>(3.81)  | 1.481***<br>(3.63)  |
| Credit rating   | 0.839***<br>(-2.61)    | 0.917**<br>(-2.49)  | 0.847**<br>(-2.49)  | 0.937*<br>(-1.89)   |
| Year FE   |                        | Yes                 |                     | Yes                 |
| State FE  |                        | Yes                 |                     | Yes                 |
| Wave FE   |                        | Yes                 |                     | Yes                 |
| Observations  |                        | 61,518              |                     | 61,518              |
| Pseudo R-squared                                      |                        | 0.0742              |                     | 0.0734              |

Table 7. Interstate bank deregulation and cross-state acquisitions: Distance between state partners and the number of state partners

This table uses the difference-in-differences method to test how out-of-state acquirers change after deregulation on the state level. The dependent variables are the mean and median distance between an acquirer and a cross-state acquisition target. Columns 1 and 2 use a sample that includes all the state-year observations from three years before interstate bank deregulation to three years after deregulation. Columns 3–6 use the sample that includes all the state-year observations from five years before interstate bank deregulation to ten years after deregulation from 1981 to 2000. “Deregulation dummy” equals one if the state is deregulated in a year, and 0 otherwise. “Deregulated years” is the number of years since deregulation. Degree of deregulation<sub>jt</sub> and Weighted degree of deregulation<sub>jt</sub> are defined in Section 3.2. “Bank integration” is the percentage of bank assets in the state  $j$  owned by banks in other states, based on the data on bank holding company (BHC) structures in bank call reports as in Morgan, Rime, and Strahan (2004). GSP<sub>jt</sub> is the measurement of the economic output of a state  $j$  in year  $t$ . It is the sum of all value added by industries within the state and serves as a counterpart to the gross domestic product (GDP). GSP growth<sub>jt</sub> is the growth rate of GSP at state  $j$  in year  $t$ . Within-state banking industry HHI<sub>jt</sub> is the Herfindahl-Hirschman index of the banking industry in state  $j$  at year  $t$ . “Mean (Median) distance to out-of-state lenders” is the mean (median) distance between the state and the out-of-state lenders. “Mean (Median) distance to out-of-state bank asset acquirers” is the mean (median) distance between the state and the out-of-state banks that own bank asset in the state. All specifications include state fixed effects and year fixed effects. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables                                       | Mean of distance between targets and acquirers |                        |                        |                            |                             |
|---|--|------------------------|------------------------|----------------------------|-----------------------------|
|   | (1)  | (2)                    | (3)                    | 2SLS<br>First stage<br>(4) | 2SLS<br>Second stage<br>(5) |
| Deregulation dummy <sub>jt</sub> : Target state | -10.836<br>(-0.09)                             |                        |                        | 0.0540*<br>(1.88)          |                             |
| Deregulated years <sub>jt</sub> : Target state  | 99.017***<br>(3.76)                            |                        |                        | 0.0297***<br>(4.73)        |                             |
| Degree of deregulation <sub>jt</sub>            |  | 137.325<br>(1.63)      |                        |                            |                             |
| Weighted degree of deregulation <sub>jt</sub>   |  |                        | 548.377*<br>(1.82)     |                            |                             |
| Within-state banking industry HHI <sub>jt</sub> | 1,311.319***<br>(3.03)                         | 1,678.133***<br>(3.89) | 1,657.128***<br>(3.85) |                            | 139.9347<br>(0.19)          |
| GSP <sub>jt</sub>                               | 925.623***<br>(6.13)                           | 1,014.412***<br>(6.74) | 1,013.720***<br>(6.74) |                            | 1,020.7088***<br>(5.52)     |
| GSP growth <sub>jt</sub>                        | -321.652<br>(-1.64)                            | -348.871*<br>(-1.76)   | -342.838*<br>(-1.73)   |                            | -311.3835<br>(-1.28)        |
| Bank integration <sub>jt</sub>                  |  |                        |                        |                            | 3,095.2722***<br>(2.86)     |
| Constant  | 1,801.537***<br>(6.07)                         | 1,911.599***<br>(6.27) | 1,994.899***<br>(6.90) | -0.3480***<br>(-4.92)      | 2,847.1501***<br>(6.50)     |
| Observations                                    | 848  | 848                    | 848                    | 848                        | 848                         |
| State FE  | Yes  | Yes                    | Yes                    | Yes                        | Yes                         |
| Year FE   | Yes  | Yes                    | Yes                    | Yes                        | Yes                         |
| Antitakeover FE                                 | Yes  | Yes                    | Yes                    | Yes                        | Yes                         |
| R-squared                                       | 0.772  | 0.769                  | 0.769                  |                            | 0.618                       |
| F-statistics                                    |  |                        |                        | 22.42                      |                             |

Table 8. Firm characteristics of targets and acquirers of cross-state acquisitions: Pre-deregulation versus post-deregulation

This table compares the firm characteristics of firms that are public targets in cross-state acquisitions before and after the target's state was deregulated. The sample includes firm-year observations from five years before interstate bank deregulation to ten years after deregulation from 1981 to 2000. See Appendix A for a full description of each variable. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables        | Pre-deregulation |        |        | Post-deregulation |        |        | Difference | <i>t</i> -statistic |
|------------------|------------------|--------|--------|-------------------|--------|--------|------------|---------------------|
|                  | Mean             | SD     | Obs.   | Mean              | SD     | Obs.   |            |                     |
| Private targets% | 0.072            | 0.254  | 11,881 | 0.143             | 0.345  | 17,388 | 0.071***   | -19.185             |
| Log (Assets)     | 4.232            | 1.643  | 377    | 4.163             | 1.804  | 1,124  | -0.064     | 0.613               |
| Market-to-book   | 1.200            | 1.106  | 333    | 2.197             | 3.568  | 1,005  | 0.997***   | -5.017              |
| Book leverage    | 0.287            | 0.252  | 376    | 0.290             | 0.273  | 1,120  | 0.003      | -0.162              |
| Return on assets | 0.083            | 0.225  | 376    | 0.056             | 0.259  | 1,119  | -0.027*    | 1.812               |
| ROA volatility   | 0.020            | 0.021  | 112    | 0.024             | 0.022  | 492    | 0.004*     | -1.835              |
| Tangibility      | 0.372            | 0.224  | 376    | 0.300             | 0.230  | 1,124  | -0.072***  | 5.271               |
| Sales growth     | 0.301            | 2.372  | 353    | 0.356             | 1.892  | 1,052  | 0.055      | -0.441              |
| Cash             | 0.124            | 0.140  | 377    | 0.147             | 0.190  | 1,124  | 0.023**    | -2.122              |
| Credit rating    | 1.072            | 0.287  | 377    | 1.160             | 0.454  | 1,122  | 0.089***   | -3.565              |
| Firm age         | 42.822           | 35.799 | 90     | 31.765            | 31.407 | 408    | -11.058*** | 2.945               |

Table 9. Interstate bank deregulation and probability of being a cross-state acquisition target: A subsample analysis

This table reports the marginal effects and *t*-statistics (in parentheses) of probit regressions that estimate the probability of becoming a target in different subsamples. The sample includes firm-year observations from five years before interstate bank deregulation to ten years after deregulation from 1981 to 2000. The dependent variable is an indicator of whether a firm becomes a cross-state acquisition target. Columns 1 and 2 include firms without credit ratings, and Columns 3 and 4 include firms with “BBB-” and above ratings. Columns 5 and 6 include firms whose total assets is in the third quartile, and Columns 7 and 8 include firms whose total assets is in the largest quartile. Columns 9 and 10 include firms whose age is below 60, and Columns 11 and 12 include firms that are older than 60 years. “Dummy: Out-of-state loan” equals one if the firm has borrowed from out-of-state banks in the past three years and zero otherwise. “Size of out-of-state loan” is the total dollar amount borrowed by the firm from out-of-state banks in the past three years. All specifications include state fixed effects, year fixed effects, and merger wave fixed effects. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

| Variables                       | Probability (of being a cross-state acquisition target) |                      |                      |                      | Probability (of being a cross-state acquisition target) |                      |                      |                      | Young                |                      | Old                  |                      |
|---------------------------------|---|----------------------|----------------------|----------------------|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                 | Unrated   |                      | Rated                |                      | Small   |                      | Large                |                      | (9)                  | (10)                 | (11)                 | (12)                 |
|                                 | (1)   | (2)                  | (3)                  | (4)                  | (5)   | (6)                  | (7)                  | (8)                  |                      |                      |                      |                      |
| Dummy: Out-of-state loan        | 0.007*<br>(1.74)  |                      | 0.000<br>(0.04)      |                      | 0.019**<br>(2.45)                                       |                      | 0.005<br>(1.46)      |                      | 0.021***<br>(3.09)   |                      | 0.005<br>(1.12)      |                      |
| Log (Size of out-of-state loan) |   | 0.001**<br>(2.56)    |                      | 0.001<br>(0.79)      |   | 0.003**<br>(2.24)    |                      | 0.001***<br>(2.78)   |                      | 0.002***<br>(4.19)   |                      | 0.001<br>(1.46)      |
| Log (Assets)                    | 0.002***<br>(4.57)                                      | 0.001***<br>(4.15)   | -0.004***<br>(-3.12) | -0.005***<br>(-3.58) |   |                      |                      |                      | 0.003***<br>(5.10)   | 0.003***<br>(4.39)   | -0.002***<br>(-2.72) | -0.002***<br>(-2.86) |
| Market-to-book                  | 0.000<br>(0.66)   | 0.000<br>(0.66)      | 0.001<br>(1.38)      | 0.000<br>(1.22)      | 0.001**<br>(2.06)                                       | 0.001**<br>(2.05)    | 0.001**<br>(2.51)    | 0.001**<br>(2.49)    | 0.000<br>(1.39)      | 0.000<br>(1.49)      | -0.000<br>(-0.04)    | -0.000<br>(-0.07)    |
| Book leverage                   | -0.000<br>(-0.31)                                       | -0.000<br>(-0.31)    | 0.009<br>(1.08)      | 0.009<br>(1.03)      | 0.008<br>(1.41)   | 0.008<br>(1.38)      | 0.010**<br>(2.44)    | 0.010**<br>(2.43)    | 0.003**<br>(2.19)    | 0.003**<br>(2.18)    | 0.003<br>(0.94)      | 0.003<br>(0.92)      |
| Return on assets                | 0.003<br>(1.62)   | 0.003*<br>(1.67)     | -0.050*<br>(-1.71)   | -0.050*<br>(-1.72)   | -0.026***<br>(-2.85)                                    | -0.026***<br>(-2.91) | -0.035**<br>(-2.49)  | -0.035**<br>(-2.53)  | -0.001<br>(-0.53)    | -0.000<br>(-0.42)    | -0.007<br>(-0.70)    | -0.006<br>(-0.68)    |
| Tangibility                     | -0.003<br>(-0.90)                                       | -0.003<br>(-0.91)    | 0.024***<br>(2.77)   | 0.024***<br>(2.80)   | 0.002<br>(0.32)   | 0.002<br>(0.31)      | 0.006<br>(1.09)      | 0.006<br>(1.11)      | -0.009**<br>(-2.01)  | -0.009*<br>(-1.93)   | 0.009**<br>(2.25)    | 0.010**<br>(2.27)    |
| Sales growth                    | -0.000<br>(-1.27)                                       | -0.000<br>(-1.28)    | -0.007<br>(-0.61)    | -0.007<br>(-0.60)    | -0.000<br>(-0.44)                                       | -0.000<br>(-0.50)    | -0.002<br>(-0.86)    | -0.002<br>(-0.90)    | -0.000<br>(-1.62)    | -0.000<br>(-1.55)    | -0.004*<br>(-1.66)   | -0.004*<br>(-1.66)   |
| Cash                            | -0.010***<br>(-2.71)                                    | -0.010***<br>(-2.63) | 0.012<br>(0.55)      | 0.013<br>(0.60)      | -0.027***<br>(-3.41)                                    | -0.027***<br>(-3.38) | -0.023**<br>(-2.02)  | -0.021*<br>(-1.89)   | -0.006<br>(-1.57)    | -0.005<br>(-1.24)    | 0.001<br>(0.14)      | 0.001<br>(0.14)      |
| Credit rating                   |   |                      |                      |                      | 0.002<br>(0.39)   | 0.002<br>(0.38)      | -0.004***<br>(-2.97) | -0.004***<br>(-3.20) | -0.011***<br>(-3.64) | -0.011***<br>(-3.48) | -0.002<br>(-1.26)    | -0.002<br>(-1.40)    |
| State FE                        | Yes   | Yes                  | Yes                  | Yes                  | Yes   | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Year FE                         | Yes   | Yes                  | Yes                  | Yes                  | Yes   | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Wave FE                         | Yes   | Yes                  | Yes                  | Yes                  | Yes   | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Observations                    | 49,311  | 49,311               | 2,404                | 2,404                | 16,154  | 16,154               | 14,323               | 14,323               | 5,254                | 5,254                | 6,280                | 6,280                |
| Pseudo R-squared                | 0.0190  | 0.0193               | 0.114                | 0.115                | 0.0322  | 0.0320               | 0.0448               | 0.0469               | 0.127                | 0.137                | 0.111                | 0.112                |

Table 10. Cumulative abnormal returns [-2, 2]: Pre-deregulation versus post-deregulation

The table reports acquirers' and targets' cumulative abnormal returns (CARs) within a two-day window [-2, 2] for completed cross-state acquisitions. Panel A compares acquirers' CARs from acquisitions across different deregulation status. Panel B separates private target acquisitions to public target acquisitions and compares acquirers' CARs across different deregulation status. Deregulation status is a vector of two dummy variables [Deregulation in acquirer's state, Deregulation in target's state]. For example, Deregulation status [0, 1] means that, at the time of the cross-state acquisition, the acquirer's state was not deregulated (0), but the target's state was deregulated (1). Panel C compares acquirer returns from cross-state acquisitions with those of within-state acquisitions. In panel C, pre-deregulation indicates deregulation status [0, 0] and post-deregulation indicates deregulation status [1, 1]. All abnormal returns are obtained from the Center for Research on Security Prices (CRSP) and estimated from the market model. All CARs are winsorized at the top and bottom 1% of the distribution. Statistical significance at the 1%, 5%, and 10% level is indicated by \*\*\*, \*\*, and \*, respectively.

*Panel A. Acquirers' CARs*

|             | Pre-deregulation |      | Post-deregulation |      | Difference | t-statistic |
|-------------|------------------|------|-------------------|------|------------|-------------|
|             | Mean             | Obs. | Mean              | Obs. |            |             |
| [0,0]-[1,1] | 0.003            | 737  | 0.015             | 6599 | 0.012***   | -3.328      |
| [0,0]-[0,1] | 0.003            | 737  | 0.013             | 126  | 0.010      | -1.483      |
| [1,0]-[1,1] | 0.013            | 126  | 0.015             | 6599 | 0.002      | -0.227      |

*Panel B. Acquirers' CARs: Private targets versus Public targets*

|                       | Pre-deregulation |      | Post-deregulation |      | Difference | t-statistic |
|-----------------------|------------------|------|-------------------|------|------------|-------------|
|                       | Mean             | Obs. | Mean              | Obs. |            |             |
| <b>Private Target</b> |                  |      |                   |      |            |             |
| [0,0]-[1,1]           | 0.004            | 609  | 0.019             | 5731 | 0.014***   | 0.000       |
| [0,0]-[0,1]           | 0.004            | 609  | 0.019             | 99   | 0.015**    | 0.049       |
| [1,0]-[1,1]           | 0.020            | 161  | 0.019             | 5731 | -0.001     | 0.864       |
| <b>Public Target</b>  |                  |      |                   |      |            |             |
| [0,0]-[1,1]           | -0.002           | 128  | -0.008            | 868  | -0.006     | 0.496       |
| [0,0]-[0,1]           | -0.002           | 128  | -0.008            | 27   | -0.006     | 0.698       |
| [1,0]-[1,1]           | -0.001           | 43   | -0.008            | 868  | -0.007     | 0.630       |

*Panel C. Cross-state versus within-state acquisitions*

|              | Pre-deregulation |           | Post-deregulation |        | Difference | t-statistic |
|--------------|------------------|-----------|-------------------|--------|------------|-------------|
|              | Mean             | Obs.      | Mean              | Obs.   |            |             |
| Cross-state  | 0.004            | 753       | 0.014             | 7,908  | -0.009**   | -2.099      |
| Within-state | 0.021            | 312       | 0.017             | 2,664  | -0.004     | 0.432       |
| Difference   |                  | -0.017*** |                   | -0.003 |            |             |
| t-statistic  |                  | -2.716    |                   | -0.945 |            |             |

Appendix. Variable definitions

| Variable                        | Source                               | Description   |
|---------------------------------|--------------------------------------|---|
| Deregulation dummy              | Amore, Schneider, and Alminas (2013) | Dummy = 1 if state i is deregulated to all the other states.  |
| Deregulation trend              | Amore, Schneider, and Alminas (2013) | Years since deregulation. The variable equals to zero before deregulation in state i, and equals to (current year t – deregulation year) after deregulation.  |
| Degree of deregulation          | Amel(2000)                           | Natural logarithm of one, plus the number of states whose banks enter state j in year t.  |
| Weighted degree of deregulation | Amel(2000)                           | Natural logarithm of one, plus the number of other states whose banks enter state j in year t, where each of these other states is weighted by their distance from the state scaled by the total distance of all the states.  |
| Gross state product (GSP)       | Federal Reserve Bank of St. Louis    | Measurement of the economic output of a state j in year t. It is the sum of all value added by industries within the state and serves as a counterpart to the gross domestic product (GDP   |
| GSP growth                      | Federal Reserve Bank of St. Louis    | Growth rate of GSP at state j in year t.  |
| Banking industry HHI            | Call report                          | Herfindahl-Hirschman index of the banking industry in state j at year t.  |
| Lead banks of a syndicated loan | SDC and call report                  | A bank is called a lead bank if the role of this bank in the syndicated loan is “Administrative agent”. If the syndicated loan does not have any “Administrative agent”, we define the banks with any of the five titles: “Lead arranger”, “Lead bank”, “Lead manager”, “Agent” or "Arranger" as lead bank. |
| Out-of-state loans              | SDC                                  | A syndicated loan with lead banks from states different from the borrowing firm.  |
| Number of out of state loans    | SDC                                  | Total number of loans borrowed by firms in state i from banks in state j and by firms in State j from banks in state i.   |
| Bank asset acquisitions         | Call report                          | The percentage of out-of-state bank assets over the total bank assets for each state based on the data on bank holding company (BHC) structures in bank call reports as in Morgan, Rime and Strahan (2004).   |

*Continued*

| Variable   | Source                            | Description   |
|--|-----------------------------------|---|
| Dummy: out of state loan                           | SDC                               | Dummy = 1 if any out-of-state loan was issued within the previous three years.  |
| Size of out of state loans                         | SDC                               | The maximum dollar amount of all the out-of-state loans within the previous three years.  |
| Dummy: direct out-of-state loans                   | SDC                               | Dummy = 1 if the firm borrowed directly from out-of-state banks within the previous three years.  |
| Dummy: out-of-state loans with local branches      | SDC                               | Dummy = 1 if the firm borrowed from out-of-state banks that have local branches within the previous three years.  |
| Dummy: Post bank merger                            | SDC, merger file from Chicago Fed | Dummy = 1 if the lead bank of the syndicated loan borrowed by the firm has been acquired by an out-of-state bank.   |
| Dummy: Bank loans                                  | SDC                               | Dummy = 1 if a syndicated loan was issued within the previous three years.  |
| Dummy: Loans from geographically diversified banks | call report                       | Dummy = 1 if a firm has loans outstanding from banks that have out-of-state branches or out-of-state bank assets .  |
| Log (Assets)                                       | Compustat                         | Log (Total assets): Log (Data 6)  |
| Market-to-Book                                     | Compustat                         | Market assets/Book assets: (Data 6 - (Data 60 + Data 74) +Data 25*Data 199)/Data 6  |
| Book leverage                                      | Compustat                         | Book debt/Total assets: (Data 6 - (Data 60 + Data 74))/Data 6   |
| Return on assets                                   | Compustat                         | EBITD/Total assets: Data 18/Data 6  |
| Tangibility  | Compustat                         | Property, plant, and equipment/Total assets: Data 7/Data 6  |
| Sales growth                                       | Compustat                         | $\Delta$ Sales/Sales: $\Delta$ Data 12/Data 12  |
| Cash   | Compustat                         | Cash and Short-term investments/Total assets: Data 1/Data 6   |
| Credit rating                                      | Standard & Poor's                 | A categorical variable that equals to 1 if the firms don't have credit rating, equals to 2 if the rating is between "D" and "BB+" and equals to 3 if the rating is above "BBB-" |

*Continued*

| Variable         | Source            | Description   |
|------------------|-------------------|---|
| Log (Assets)     | Compustat         | Log (Total assets): Log (Data 6)  |
| Market-to-book   | Compustat         | Market assets/Book assets: $(\text{Data 6} - (\text{Data 60} + \text{Data 74}) + \text{Data 25} * \text{Data 199}) / \text{Data 6}$   |
| Book leverage    | Compustat         | Book debt/Total assets: $(\text{Data 6} - (\text{Data 60} + \text{Data 74})) / \text{Data 6}$   |
| Return on assets | Compustat         | EBITD/Total assets: $\text{Data 18} / \text{Data 6}$  |
| Tangibility      | Compustat         | Property, plant, and equipment/Total assets: $\text{Data 7} / \text{Data 6}$  |
| Sales growth     | Compustat         | $\Delta \text{ Sales} / \text{Sales}$ : $\text{Data 12} / \text{Data 12}$   |
| Cash             | Compustat         | Cash and Short-term investments/Total assets: $\text{Data 1} / \text{Data 6}$   |
| Credit rating    | Standard & Poor's | A categorical variable that equals one if the firms do not have credit rating, equals two if the rating is between "D" and "BB+", and equals three if the rating is above "BBB-". |