Bank Competition and Cost of Equity Capital

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Abstract

Using a large panel of U.S. public firms, we exploit the staggered deregulation of interstate bank branching laws to examine whether banking competition affects the implied cost of equity. Contrary to conventional wisdom, we find that banking competition increases the cost of equity for borrowing firms, as banking competition weakens banks' monitoring and governance role. Our findings are robust to several econometric specifications, including controlling for potential endogeneity and a variety of approaches to gauging cost of equity. This effect is more pronounced for firms with higher external finance dependence, weaker corporate governance, and higher firm risk. Overall, these results shed light on the information disadvantage of competition in banking industry, which negatively impacts shareholders' value via discount rate hikes.

JEL Classifications: G30; G32.

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1. Introduction

Capital structure theory suggests that a firm finance itself using either equity or debt (i.e., public debt and bank loan credit), both at a cost. Pecking order theory suggest the costs of both equity and debt play a pivotal role in firm investment and financing decisions, but firms prioritize cheaper debt financing over equity financing. Although it is believed that banking competition increases credit supply and reduces the cost of debt (see, e.g., Rice and Strahan, 2010 and the references thereafter), less is known about whether and how banking competition affects the cost of equity of borrowers[1]. On the one hand, in an ideal world without frictions, cost of equity and cost of debt may move at the same direction as equity and debt can substitute each other (e.g., Dick-Nielsen et al., 2022). On the other hand, to take advantage of lower cost of debt, firms may take more debt and increase the corporate leverage, which develops into increased cost of equity due to higher default probability. Ultimately, it is an empirical question whether banking competition increases or decreases borrowers' cost of equity, and we are the first to answer it, to the best of our knowledge. Specifically, we examine the impact of banking industry development on the non-banking firms' *ex ante* implied cost of equity capital.

The major challenge to address this issue is that investors' perception of equity investment risk could be endogenous to the competition in local banking markets. Thus, we exploit the staggered deregulation of U.S. interstate bank branching laws as plausibly exogenous variation in banking competition to alleviate endogeneity concerns and make causal inferences. In September 1994, the U.S. President Clinton signed the Riegle-Neal Interstate Banking and Branching

[1] In this study, we define borrowers in a general way, including all non-financial firms. Although some firms borrow from other lenders instead of banks directly, they still benefit from the decreased borrowing costs due to bank deregulation. According to Faulkender & Petersen (2006) and Sufi (2009), more than 80% of the listed firms from the Compustat universe utilize bank lines of credit.

Efficiency Act (IBBEA), which legalized banking and branching activities across state boarders. Nonetheless, the IBBEA provisions allowed states to erect roadblocks to branch expansion, and some states exploited these provisions by preventing out-of-state banks from *de novo* branching or acquiring existing ones, by mandating age restrictions, or by limiting the deposit cap on branch acquisitions (Rice and Strahan, 2002). State exercise of such powers restricted entry by large, national banks and distorted their means of entry. The differences in regulatory barriers to interstate branching exerted plausibly exogenous effect on bank capital supply and firms' borrowing costs (Rice and Strahan, 2002, 2010; Amore et al., 2013; Chava et al., 2013).

Two hypotheses conjecture that banking competition may affect borrowing firms' cost of equity capital. On the one hand, cost of equity may decrease due to more efficient monitoring, which results from the market selection mechanism to remove less efficient banks because of competition (Jayaratne and Strahan, 1996, 1998; Strahan, 2003)[2]. Bank deregulation leads to large banks, which are better at monitoring due to their greater information collecting and processing advantages (Petersen and Rajan, 2002; Stein, 2002; Berger et al., 2005; Liberti and Petersen, 2019).

To test the above views on the effect of banking competition on cost of equity, we conduct a quasi-natural experiment using the staggered deregulation of bank branching across U.S. state borders over the period of 1980-2010. Following prior studies (e.g., Hail and Leuz, 2006, Dhaliwal et al., 2016), we measure a borrowing firm's cost of equity as the average of four implied cost of equity estimates based on analysts' earnings forecast data. Consistent with the second hypothesis, we find significant and robust evidence that increased banking competition exacerbates borrowers' cost of equity. This effect is both statistically and economically significant. After controlling for

[2] For instance, Jayaratne and Strahan (1996, p. 641) explicitly state that after deregulation "banks do not necessarily lend more, but they appear to lend better".

various firm-specific characteristics as well as fixed effects related to the cost of equity, *ceteris paribus*, we find that firms in states completely open to interstate branching bear 21.6-basis-point (=0.054*4*100) higher cost of equity than the ones in states without interstate branching, which translates to about 5% of our sample mean. These results are robust to controlling for a battery of control variables, year-state-industry or year-firm fixed effects.

Although the staggered interstate bank deregulatory events are plausibly exogenous changes to banking competition, state-level factors that manifest differently across states possibly affect the timing of bank deregulation in different states (Kroszner and Strahan, 1999). Hence, our results are possibly driven by reverse causality, whereby differences in the cost of equity across states triggered interstate bank deregulation. To address this concern, we follow the literature (e.g., Bertrand and Mullainathan, 2003; Cornaggia et al., 2015) and examine the dynamics of the cost of equity surrounding the deregulatory events. We find no prior trend in terms of the cost of equity, which suggests that reverse causality does not explain our main findings.

Omitted variables coinciding with interstate bank deregulation may be the cause of the changes in the cost of equity. If so, the changes in the cost of equity we attribute to interstate bank deregulation merely reflect an association instead of causality. Since our benchmark identification strategy employs shocks that affect different states at different times, it is unlikely that an omitted variable unrelated to interstate bank deregulation would fluctuate every time (or even most of the time) a deregulatory event occurs. Hence, our strategy of using multiple shocks due to staggered interstate bank deregulation across states mitigates the concern of omitted variables.

Still, we follow the literature (e.g., Cornaggia et al., 2015) and address this possibility by conducting falsification tests. We begin by obtaining an empirical distribution of years when states deregulated from Rice and Strahan (2010). Next, we randomly assign states (without replacement) into each of these interstate bank deregulation years following the empirical distribution. This approach maintains the distribution of interstate bank deregulatory years from our benchmark specification, but it disrupts the proper assignment of interstate bank deregulation years to states. Hence, if an unobservable shock occurs at approximately the same time as the interstate bank deregulation events in the mid-1990s, it should still reside in the testing framework, and hence possibly drive the results. Otherwise, our pseudo assignments of interstate bank deregulatory years to states should weaken our results when we re-estimate the benchmark specification. We, indeed, find these falsely assumed interstate bank deregulatory events have little effect on the cost of equity. These non-results from our falsification tests further mitigate the omitted variable's concern.

Our results are robust to the propensity score matching and difference-in-difference analysis, various additional controls, and a variety of approaches to gauging cost of equity, thus further alleviating the endogeneity concerns. Collectively, these analyses suggest a causal interpretation of a positive effect of bank deregulation on the cost of equity.

After demonstrating that there is an aggregate increase in the cost of equity following increased banking competition from the IBBEA, we examine the potential monitoring channel in both direct and indirect ways to explain this result.

On the one hand, we follow the literature (Smith, 1993; Rajan and Winton, 1995; Nini et al., 2009; Demerjian and Owens, 2016) and use data on debt covenants to directly test banks' monitoring channel. Less strictly monitoring usually involves a smaller number of private debt covenants and hence a smaller probability of debt covenant violation. We find that both the number of private debt covenants and the probability of debt covenant violation decrease after bank deregulation, which is direct evidence supporting the weakened monitoring channel. The effect of bank deregulation on cost of equity is more pronounced for firms with larger account of relationship lending, which also directly supports our conjecture of the bank monitoring channel.

On the other hand, we indirectly test the weakened monitoring channel by splitting the firms in our sample based on their external finance dependence, weaker corporate governance, and higher firm risk. First, we test whether companies' external finance dependence affects the way their cost of equity responds to changes in state-level banking competition. We expect that banking competition relaxes financing constraints for firms that are highly external-finance-dependent. Therefore, these firms should experience increases in the cost of equity. This is precisely what we find. Using the measure of external finance dependence developed by Rajan and Zingales (1998), bank loan ratio as well as bank loan amount, we find external-finance dependent firms located in states that are completely open to interstate bear 11.6-basis-point (=0.029*4*100) and 22-basis-point (=0.055*4*100) higher cost of equity after branching deregulation than firms in states with the most restrictions on interstate branching, respectively.

Second, the strength of corporate governance before deregulatory events provides another way to test how the cost of equity responds with changes in banking competition. As banking competition increases, we expect the cost of equity of firms with weak corporate governance to react differently compared to firms with strong corporate governance. We hypothesize and observe that the cost of equity increases more for firms with an above-median G-index (Gompers et al., 2003), below-median institutional ownership, and below-median analyst coverage. Like the previous external finance dependence results, these results provide evidence that the cost of equity increases after bank deregulation due to the weakened banks' monitoring and governance role.

Finally, we test a firm risk-based explanation for the positive effect of branching deregulation on the cost of equity. We conjecture that the cost of equity increases more for risky firms than stable firms after bank deregulation due to the weakened banks' monitoring and governance role. Consistent with this conjecture, we find the overall positive effects of banking competition on the cost of equity are particularly strong among firms with above-median idiosyncratic volatility, above-median cash flow volatility, or above-median earnings volatility.

Overall, all these results suggest that the weakened banks' monitoring and governance role is a possible mechanism that helps explain the overall positive relation between state-level banking competition and the cost of equity.

We make the following contributions. First, we add to the strand of literature on the economic/financial consequences of interstate bank deregulation by documenting an unexpected side effect on the cost of equity. The existing literature has exploited bank deregulation as a regulatory shock to banking competition and credit supply (e.g., Black and Strahan, 2002; Cetorelli and Strahan, 2006; Zarutskie, 2006; Rice and Strahan, 2010; Chava et al., 2013; Cornaggia et al., 2015; Hombert and Matray, 2017; Bai et al., 2018; Cornaggia and Li, 2019; John et al., 2020)[3], but mostly not from the monitoring perspective, although bank deregulation fundamentally altered the nature of bank monitoring (Jayaratne and Strahan, 1996, 1997). We add to these studies by examining whether bank deregulation reduces borrowers' cost of equity via plausibly exogenous changes to bank monitoring, and a structural change in the banking industry through interstate

[3] Some less relevant existing literature investigate the corporate consequences of bank deregulation on income distribution (Beck et al., 2010), productivity (Krishnan et al, 2015; Neuhann and Saidi, 2018), banks' loan-loss provisions (Dou et al., 2018), household financial inclusion (Célerier and Matray, 2019), systemic risk (Chu et al., 2020), banks' funding cost (Levine et al., 2021), etc.

deregulation may introduce negative externality as it weakens banks' monitoring and governance role.

Second, our study adds to the growing literature on the determinants of cost of equity. The relatively recent literature suggests that the cost of equity is negatively correlated with customer satisfaction (Truong et al., 2021), annual reporting quality (Rjiba et al., 2021) and corporate integrity culture (Chen et al., 2022), but positively corrected with executive pay disparity (Chen et al., 2013), negative environmental externalities (Chava, 2014) customer-base concentration (Dhaliwal et al., 2016), and director and officers' liability insurance (Chen et al., 2016), capital gains tax (Huizinga et al., 2018), institutional trading costs (Brugler et al., 2021), etc. As most determinants in the literature are endogenously associated with unobserved characteristics of firms/managers, we contribute to the literature by establishing causality with a quasi-natural experiment based on the staggered passage of bank branch deregulation.

Third, we also contribute to the strand of literature which argues that the changes in the bank industry have a knock-on effect on the borrowers, with an emphasis on the public firms (Khan and Lo, 2019; Su, 2021)

The remainder of this paper is organized as follows. Section 2 introduces our methodology and variable definitions, while Section 3 describes our data. Section 4 presents the empirical results. Section 5 concludes.

2. Data and Methodology

2.1. Data Sources

To estimate the implied cost of equity capital, we obtain analyst forecast data from the Institutional Brokers' Estimate System (I/B/E/S), stock return data from the Center for Research in Security Prices (CRSP) database, and financial data from Compustat. We define banking competition using firm headquarters data based on Bai et al. (2020) which takes a small fraction of headquarters relocations into account. We merge these databases to create our main sample. Our sample period begins with fiscal year 1980, the first year for which we can estimate cost of equity using enough analyst forecast data. Our sample ends with 2010, five years after the last state revised interstate branching provisions. We require firms to be incorporated in the U.S. and have non-missing data for the main variables. We exclude utilities (SIC 4900–4999) and financial firms (SIC 6000–6999). The final sample consists of 45,164 firm-years observations for 5617 public U.S. firms.

2.2. Implied Cost of Equity Capital Estimates

Consistent with Dhaliwal et al. (2016), we estimate the *ex ante* cost of equity capital (in percentages) that is implied in current share prices and earnings forecasts (minus the risk-free rate). Specifically, we estimate four cost of equity models developed by Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004), and Ohlson and Juettner-Nauroth (2005), subtract the 10-year Treasury bond yield (as of June of year t) from each estimate, and label them R_{CT}, R_{GLS}, R_{MPEG}, and R_{OJN}, respectively. Given that existing literature has little consensus among the performance of those models (Guay et al., 2011), we take the mean of the above four model estimates as our measure of the cost of equity and denote it as R_{AVG}.

2.3. Measure of Banking Competition

Consistent with Rice and Strahan (2010) and Cornaggia et al. (2015), we employ an index of interstate branching restrictions, *RSINDEX*, to proxy for state-level banking competition. As described in Rice and Strahan (2010), the IBBEA allowed states to lift out-of-state entry restrictions from the time of enactment in 1994 until the branching trigger date of June 1, 1997. Specifically, states could set regulations on interstate branching with regard to four important provisions: (1) the minimum age of the target institution, (2) de novo interstate branching, (3) the acquisition of individual branches, and (4) a statewide deposit cap. *RSINDEX* indicates the number of regulations a state sets on interstate branching, ranging from zero (the most open stance) to four (the most regulated stance).

2.4. General Empirical Methodology

We examine the impact of banking competition and firm-level cost of equity capital by estimating the following model:

$$Cost\ of\ equity_{i,t} = \alpha_1 RSINDEX_{i,t} + X_{i,t}\beta + \mu_i + Year_t + \varepsilon_{i,t} \tag{1}$$

where the dependent variable is the implied cost of equity (R_{AVG}), calculated as the average of the four individual estimates R_{CT}, R_{GLS}, R_{MPEG}, and R_{OJN}. The independent variable of interest is *RSINDEX*, the restrictiveness of the state toward out-of-state branching. $X_{i,t}$ is a set of control variables including stock return beta (*BETA*), return on assets (*ROA*), leverage (*LEV*), book-to-market ratio (*BTM*), log market value of equity (*SIZE*), the forecasted long-term growth rate (*LTG*), analyst forecast dispersion (*DISP*), and idiosyncratic risk (*IDVOL*). Our controls are largely consistent with prior studies on implied cost of equity (e.g., Dhaliwal et al., 2016). Appendix A provides the definitions of all variables used in this study. We control for year and firm fixed effects and cluster standard errors by year in our baseline tests. Including firm fixed effects in the model helps address the potential endogeneity concern driven by firm-level time-invariant omitted variables.

3. Empirical Results

We present our empirical results in this section. We start our analysis with a panel data model with fixed effects as our baseline model, and move to endogeneity tests, falsification test and other robustness tests afterwards. After establishing a causal interpretation of a positive effect of bank deregulation on the cost of equity, we examine the potential monitoring channel in both direct and indirect ways to explain this causal relationship.

3.1. Baseline Results

Table 1 presents the descriptive statistics of the main variables used in our regressions. Our sample consists of 45,164 firm-years observations for 5617 public U.S. firms over the period 1980-2010. All variables are winsorized at the 1% and 99% levels. The average cost of equity measure has a mean value of 4.093% and standard deviation of 2.810%, which is of a similar magnitude of the ones in the literature (e.g., Chen et al., 2013). The mean value of the bank deregulation indicator, RSINDEX, is 2.867, similar to that reported by Rice and Strahan (2010). The descriptive statistics of other variables are largely in line with those reported in prior studies (e.g., Chen et al., 2016; Dhaliwal et al., 2016; Truong et al., 2021), and thus we omit discussing them herein for brevity.

Table 2 reports the baseline results from the panel data model with fixed effects. The dependent variable is the implied cost of equity (R_{AVG}) calculated as the average of the four individual estimates detailed in Appendix A. Banking competition is proxied by Rice-Strahan index (*RSINDEX*) of interstate banking deregulation based on Rice and Strahan (2010). Each column reports the estimated coefficients from regressions that differ by either control variables and/or fixed effects.

[Insert Table 2 about here]

In Column 1, we exclude all the control variables but control for Year, State and Industry fixed effects. The coefficient of *RSINDEX* is negative and statistically significant at a 1% level (estimated coefficient = -0.057; *t*-statistic = -3.86), suggesting that non-banking firms' costs of capital increase after bank deregulation. According to Column 2-4, this finding is qualitatively unchanged after controlling for a battery of control variables, and replacing year-state-industry with year-firm fixed effects. This effect is not only statistically significant, but also economically large. After controlling for various firm-specific characteristics as well as fixed effects related to the cost of equity, *ceteris paribus*, we find that firms in states completely open to interstate branching bear 21.6-basis-point (=0.054*4*100) higher cost of equity than the ones in states without interstate branching, which translates to about 5% of our sample mean.

3.2. Endogeneity

3.2.1. Pre-treatment Trends Analysis

Although the staggered interstate bank deregulatory events are plausibly exogenous changes to banking competition, state-level factors that manifest differently across states possibly affect the timing of bank deregulation in different states (Kroszner and Strahan, 1999). Hence, our results are possibly driven by reverse causality, whereby differences in the cost of equity across states triggered interstate bank deregulation. To address this concern, we follow the literature (e.g., Bertrand and Mullainathan, 2003; Cornaggia et al., 2015) and examine the dynamics of the cost of equity surrounding the deregulatory events. Specifically, we decompose each of the four components of the *RSINDEX* into four indicator variables associated with four periods around the deregulation year, namely all years up to three years prior to deregulation, two years preceding deregulation, two years following deregulation, and three years or more after deregulation. We then add up the four components of the *RSINDEX* to obtain $Before^{3+}$, $Before^{1,3}$, $After^{1,3}$, and $After^{3+}$. The model specification is as follows.

$$Cost\ of\ equity_{i,t} = \beta_0 + \beta_1 Before_{i,t}^{3+} + \beta_2 Before_{i,t}^{1,3} + \beta_3 After_{i,t}^{1,3} + \beta_4 After_{i,t}^{3+} + \\ + X_{i,t}\beta + \mu_i + Year_t + \varepsilon_{i,t}. \quad (2)$$

Table 3 presents the dynamic estimation results of the effect of banking competition on cost of equity. For each state, we exclude the year whenever the deregulation happens. Both columns report the statistically insignificant estimated coefficients for $Before^{3+}$ and $Before^{1,3}$, but statistically significant estimated coefficients for $After^{1,3}$, and $After^{3+}$. Overall, we find no pre-treatment trend in terms of the cost of equity, which suggests that reverse causality does not explain our main findings.

[Insert Table 3 about here]

3.2.2. Falsification Test

It may also be possible that an omitted variable coinciding with interstate bank deregulation is the true underlying cause of the changes in the cost of equity. If so, then the changes in the cost of equity we attribute to interstate bank deregulation merely reflect an association instead of causality. Since our benchmark identification strategy employs shocks that affect different states at different times, it is unlikely that an omitted variable unrelated to interstate bank deregulation would fluctuate every time (or even most of the time) a deregulatory event occurs. Hence, our strategy of using multiple shocks due to staggered interstate bank deregulation across states mitigates the concern of omitted variables.

Still, we follow the literature (e.g., Cornaggia et al., 2015) and address this possibility by conducting falsification tests. We begin by obtaining an empirical distribution of years when states deregulated from Rice and Strahan (2010). Next, we randomly assign states (without replacement) into each of these interstate bank deregulation years following the empirical distribution. This approach maintains the distribution of interstate bank deregulatory years from our benchmark specification, but it disrupts the proper assignment of interstate bank deregulation years to states. Hence, if an unobservable shock occurs at approximately the same time as the interstate bank deregulation events in the mid-1990s, it should still reside in the testing framework, and hence possibly drive the results. Otherwise, our pseudo assignments of interstate bank deregulatory years to states should weaken our results when we re-estimate the benchmark specification. We, indeed, find these falsely assumed interstate bank deregulatory events have little effect on the cost of equity. These non-results from our falsification tests further mitigate the omitted variable's concern.

[Insert Table 4 about here]

3.2.3. Propensity Score Matching and Difference-in-Difference Analysis

To further address endogeneity concerns, we implement a propensity score matching and difference-in-difference analysis. Specifically, we balance the observed covariate differences between the treatment and control groups, we implement the difference-in-difference estimation using a propensity-score-matched sample. We perform one-to-one matching to the nearest neighborhood, based on industry, state, year, and all control variables used in the baseline regression model, using a caliper width of 0.01 with the restriction of common support and no replacement. The treatment group consists of firms headquartered in states that deregulated in the test window. The control group consists of firms headquartered in states that have not deregulated in the test window. Both the treatment and control firms must have data available in at least one year around the deregulation.

We identify 2262 pairs of pre- and post- deregulation firm-years in the treatment and control groups. Panel A of Table 5 compares the characteristics of firms in both the treatment and control groups. The results show that all the univariate differences in the firm characteristics are statistically insignificant, suggesting that any difference in terms of cost of equity between the treatment and control groups should be due to bank deregulation, rather than observable firm characteristics. Panel B reports the regression results based on the matched sample. *Treatment* is a dummy variable equal to one if the firm is headquartered in a state that deregulates, and zero otherwise. *Post* is a dummy variable equal to one in the years after bank regulation, and zero otherwise. The variable of interest, Treatment × Post, captures the effect of bank deregulation on the treatment firms in the post-deregulation period. The results show that the coefficients on Treatment × Post are significantly positive at the conventional 5% level, suggesting that the cost of equity of the treatment firms increases following the passage of bank deregulation. Overall, the regression results are consistent with our baseline finding that bank deregulation increase cost of equity.

[Insert Table 5 about here]

3.3. Robustness

In this subsection, we further check whether our results are subject to alternative sets of control variables, and alternative measures of cost of equity.

3.3.1. Adding Additional Control Variables

To check the robustness of our findings, we perform a variety of robustness tests. To economize on space, we selectively report and discuss the results from these tests incorporating more control variable in Panel A of Table 6. Specifically, we focus on three additional state-level macro control variables: GDPGROWTH, GDPPERCAP and POLBALANCE. Relying on data from Bureau of Economic Analysis, we use GDPGROWTH (GDPPERCAP) to denote GDP growth (GDP per capita) measured as state-level GDP percent change (GDP over population). We also use POLBALANCE to measure political balance measured as state-level fraction of the members of the House of Representatives from the Democratic Party in the current year.

According to results in in Panel A of Table 6, our estimated coefficient for our variable of interest (i.e., RSINDEX) remain negative and statistically significant at the 1% level, no matter whether we further control for each of the state-level macro variable individually or all of them together. The magnitude of our estimated coefficient for our variable of interest (i.e., RSINDEX) also doesnot change much, which add robustness to our previous findings.

[Insert Table 6 about here]

3.3.2. Alternative Measures for Cost of Equity

We further check the robustness using alternative measures for cost of equity. Unlike our baseline model using the mean value of the four individual cost of equity measures obtained from

Gebhardt et al.'s (2001) model (R_{GLS}), Claus and Thomas's (2001) model (R_{CT}), Ohlson and Juettner-Nauroth's (2005) method (R_{OJN}), and Easton's (2004) method (R_{MPEG}), now we separately consider the four individual cost of equity measures well as their median value (R_{MED}) of all these four individual measures.

Panel B of Table 6 presents the regression estimates. We still find a negative and statistically significant estimated coefficient for RSINDEX for the cost of equity measures obtained from the Gebhardt et al.'s (2001) model (R_{GLS}) and Claus and Thomas's (2001) model (R_{CT}) at the 5% level in Columns (1) and (2), for the cost of equity measure obtained from the Easton's (2004) method (R_{MPEG}) at the 10% level in Column (4), for the cost of equity measures obtained from Ohlson and Juettner-Nauroth's (2005) method (R_{OJN}) and their median value (R_{MED}) of all these four individual measures at the 1% level in columns (3) and (5), respectively. The magnitude of our estimated coefficient for our variable of interest (i.e., RSINDEX) also does not change much, which add robustness to our previous findings.

5. Mechanisms

5.1. Direct Tests of the Banks Monitoring Channel

In this subsection, we follow the literature (Smith, 1993; Rajan and Winton, 1995; Nini et al., 2009; Demerjian and Owens, 2016) and directly test the banks' monitoring channel. Less strictly monitoring usually involves a smaller number of private debt covenants and hence a smaller probability of debt covenant violation. We find that both the number of private debt covenants and the probability of debt covenant violation decrease after bank deregulation, which is direct evidence supporting the weakened monitoring channel. Meanwhile, we find the effect of bank deregulation on cost of equity is more pronounced for firms with larger account of relationship lending, which also directly supports our conjecture of the bank monitoring channel.

5.1.1. Private Debt Covenants

After demonstrating that there is an aggregate increase in the cost of equity following increased banking competition from the IBBEA, we examine the potential monitoring channel in both direct and indirect ways to explain this result.

On the one hand, we directly test the conjecture that whether bank deregulation weakens banks' monitoring and governance role. Less strictly monitoring usually involves a smaller number of private debt covenants and hence a smaller probability of debt covenant violation. We find that both the number of private debt covenants and the probability of debt covenant violation decrease after bank deregulation, which is direct evidence supporting the weakened monitoring channel.

We merge Dealscan loan package data with Compustat and then regress the total number of covenants and three different variables of covenant violation probability on *RSINDEX* and a set of control variables. Specifically, following Demerjian and Owens (2016), we define covenant violation probability for each loan package as (1) aggregate probability of covenant violation across all covenants included on a given loan package (*PVIOL*); (2) aggregate probability of covenant violation across all performance covenants included on a given loan package (*PVIOL_PCOV*); and (3) aggregate probability of covenant violation across all capital covenants included on a given loan package (*PVIOL_CCOV*). Then we obtain firm-level covenant violation probability by taking the annual average of each measure.

[Insert Table 7 about here]

Table 7 presents the impact of banking competition on financial covenants in private debt contracts. Consistent with our conjectured channel of the decreased bank monitoring after bank deregulation, we find a positive and statistically significant estimated coefficient for the number of covenants at the 1% level in column (1), a positive and statistically significant estimated coefficient for *PVIOL* at the 5% level in column (2), a positive and statistically significant estimated coefficient for *PVIOL_PCOV* at the 10% level in column (3), and a positive and statistically significant estimated coefficient for *PVIOL_CCOV* at the 5% level in column (4), respectively. After bank deregulation, the number of private debt covenants decrease (Column 1), the aggregate probability of covenant violation across all covenants included on a given loan package decrease (Column 2), the aggregate probability of covenant violation across all performance covenants included on a given loan package (Column 3), and aggregate probability of covenant violation across all capital covenants included on a given loan package (Column 4).

5.1.2. Relationship Lending

Meanwhile, we examine whether the effect of bank deregulation on cost of equity is more pronounced for firms with larger account of relationship lending. Our first proxy for lending relationship is the average distance between firms and their main lenders in 1998 at the two-digit SIC level, based on the National Survey of Small Business Finances in 1998. Following Bharath et al. (2011), we measure lending relationship strength as (1) the amount of relationship lending, defined as the annual average ratio of the facility value with the lead bank(s) to the total value of loans borrowed by the firm in the last five years, and (2) the number of relationship lending, defined as the annual average ratio of the facility number with the lead bank(s) to total number of loans borrowed by the firm in the last five years. We set three dummy variables, AVDIS_DUM, RELAMT_DUM, RELNO_DUM, as one for firms with below-median distance, above-median amount of relationship lending, and above-median number of relationship lending, respectively.

The results are reported in Table 8. Consistent with our conjectured channel of the decreased bank monitoring after bank deregulation, we find a negative and statistically significant estimated coefficient for the interaction term between RSINDEX and AVDIS_DUM at the 1% level in Column (1), the interaction term between RSINDEX and RELAMT_DUM at the 5% level in Column (2), the interaction term between RSINDEX and RELNO_DUM at the 10% level in Column (3). That is to say, the effect of increased cost of equity after bank deregulation is more pronounced in firms with a below-median distance (Column 1), above-median REL_Amount (Column 2), and above-median REL_Number (Column 3),

[Insert Table 8 about here]

5.2. Indirect Tests of the Banks Monitoring Channel

In this subsection, we indirectly examine the effect of bank deregulation on the cost of equity of non-financial firms via three subsample analyses: external finance dependence, corporate governance, and firm risk.

5.2.1. External Finance Dependence

First, we test whether companies' external finance dependence affects the way their cost of equity responds to changes in state-level banking competition. Using the measure of external finance dependence developed by Rajan and Zingales (1998) and the bank loans, we set three dummy variables as one for above-median external financial dependence, bank loan ratio, and bank loan amount, respectively (EFD, LOANRATIO, and LNLOAN).

We expect that banking competition relaxes financing constraints for firms that are highly external-finance-dependent. Therefore, these firms should experience increases in the cost of equity. The results reported in Table 9 suggest that the coefficients on the interactions between banking competition index and external finance dependence are significantly negative. Specifically, external-finance dependent firms located in states that are completely open to interstate bear 11.6-basis-point (=0.029*4*100) to 24-basis-point (=0.060*4*100) higher cost of equity after branching deregulation than firms in states with the most restrictions on interstate branching, respectively.

[Insert Table 9 about here]

5.2.2. Corporate Governance

Second, firms' weakness of corporate governance before deregulatory events provides another way to test how the cost of equity responds with changes in banking competition. As banking competition increases, we expect the cost of equity of firms with weak corporate governance to react differently compared to firms with strong corporate governance. We hypothesize and observe that the cost of equity increases more for firms with weak corporate governance.

Specifically, we split the sample based on whether the firm in our sample has an above-median G-index (Gompers et al., 2003), below-median institutional ownership, and below-median analyst coverage. If so, we deem this firm as a firm with weak corporate governance. We conjecture that the cost of equity for these firms increase after bank deregulation. Accordingly, we set three dummy variables as one for firms with an above-median G-index (GINDEX), below-median institutional ownership (INSOWN) and below-median analyst coverage (COVER), respectively.

The results are reported in Table 10. Consistent with our conjectured channel of the decreased bank monitoring after bank deregulation, we find a negative and statistically significant estimated coefficient for the interaction term between RSINDEX and GINDEX at the 10% level in Column

(1), the interaction term between RSINDEX and INSOWN at the 5% level in Column (2), the interaction term between RSINDEX and COVER at the 1% level in Column (3). That is to say, the effect of increased cost of equity after bank deregulation is more pronounced in firms with an above-median G-index (Column 1), below-median institutional ownership (Column 2), and below-median analyst coverage (Column 3).

[Insert Table 10 about here]

Like the previous external finance dependence results, these results provide evidence that the cost of equity increases after bank deregulation due to the weakened banks' monitoring and governance role.

5.2.3. Firm Risk

Finally, we test a firm risk-based explanation for the positive effect of branching deregulation on the cost of equity. We set three dummy variables as one for above-median idiosyncratic volatility (IDVOL_DUM), above-median cashflow volatility (CF_VOL_DUM) and above-median earnings volatility (EARN_VOL_DUM), respectively. We conjecture that the cost of equity increases more for risky firms than stable firms after bank deregulation due to the weakened banks' monitoring and governance role.

The results are reported in Table 11. Consistent with our conjectured channel of the decreased bank monitoring after bank deregulation, we find a negative and statistically significant estimated coefficient for the interaction term between RSINDEX and IDVOL_DUM at the 5% level in Column (1), the interaction term between RSINDEX and CF_VOL_DUM at the 5% level in Column (2), the interaction term between RSINDEX and EARN_VOL_DUM at the 1% level in Column (3). That is to say, the effect of increased cost of equity after bank deregulation is particularly strong among firms with above-median idiosyncratic volatility (IDVOL_DUM), above-median cashflow volatility (CF_VOL_DUM) and above-median earnings volatility (EARN_VOL_DUM).

[Insert Table 11 about here]

6. Concluding Remarks

We investigate the relationship between bank competition and the cost of equity of non-financial borrowers. To alleviate potential endogeneity concerns, we use a large panel of U.S. public firms over the period 1980-2010 and exploit the deregulation of interstate bank branching laws to examine whether banking competition affects the cost of equity capital. Contrary to conventional wisdom, we find that banking competition increases the cost of equity for borrowing firms, as banking competition weakens banks' monitoring and governance role.

Importantly, we find that little evidence of pre-treatment trends or reverse causality and that the significantly increased cost of equity is only observed post-deregulation.

Although our strategy of using multiple shocks due to staggered banking deregulation across states mitigates the omitted variables concern, we further address this possibility by conducting falsification tests. These non-results from our falsification tests further mitigate the omitted variable's concern.

Our results are robust to the propensity score matching (PSM) analysis, various additional control variables and a variety of approaches to gauging cost of equity, thus further alleviating the concerns about endogeneity. Collectively, these analyses suggest a causal interpretation of a positive effect of bank deregulation on the cost of equity.

Less strictly monitoring usually involves a smaller number of private debt covenants and hence a smaller probability of debt covenant violation. We find that both the number of private debt covenants and the probability of debt covenant violation decrease after bank deregulation, which is direct evidence supporting the weakened monitoring channel. Moreover, the effect of bank deregulation on cost of equity is more pronounced for firms with larger account of relationship lending, higher external finance dependence, weaker corporate governance, and higher firm risk, which is consistent with our conjecture that banking competition weakens banks' monitoring and governance role. Overall, our findings highlight the dark side of competition in banking industry, i.e., the consequently information disadvantage may negatively impact shareholders' value via improved cost of equity.

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Table 1. Descriptive Statistics

This table reports the descriptive statistics for variables used in the baseline empirical analyses. The sample consists of 45,164 firm-years observations for 5617 public U.S. firms over the period 1980-2010. All variables are winsorized at the 1% and 99% levels. Variable definitions are listed in Appendix A.

Variable	N	Mean	Std. Dev.	25^{th}	Median	75^{th}
R_{AVG}	45,164	4.093	2.810	2.243	3.753	5.545
RSINDEX	45,164	2.867	1.425	2.000	3.000	4.000
BETA	45,164	0.996	0.518	0.624	0.942	1.305
ROA	45,164	0.069	0.083	0.024	0.062	0.107
LEV	45,164	0.214	0.183	0.055	0.192	0.324
BTM	45,164	0.521	0.333	0.286	0.454	0.681
SIZE	45,164	6.550	1.665	5.341	6.430	7.610
LTG	45,164	0.168	0.103	0.110	0.150	0.200
DISP	45,164	0.103	0.260	0.010	0.028	0.077
IDVOL	45,164	0.026	0.012	0.017	0.023	0.032

Table 2. Baseline Results

This table presents the regression results of the effect of banking competition on the implied cost of equity. The dependent variable is the implied cost of equity (R_{AVG}) calculated as the average of the four individual estimates. Banking competition is proxied by Rice-Strahan index (*RSINDEX*) of interstate banking deregulation based on Rice and Strahan (2010). Other variable definitions are presented in Appendix A. Our unbalanced panel of observations is at the firm-year level from 1980 to 2010. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable：Cost of Equity Mean R_{AVG}			
	(1)	(2)	(3)	(4)
RSINDEX	-0.057***	-0.041**	-0.048***	-0.054***
	(-3.86)	(-2.55)	(-3.12)	(-3.23)
BETA		0.202**	0.105*	0.104*
		(2.50)	(1.79)	(1.77)
ROA		-0.929***	-1.333***	-1.333***
		(-3.42)	(-4.88)	(-4.89)
LEV		2.583***	2.234***	2.236***
		(17.72)	(13.24)	(13.22)
BTM		1.694***	1.093***	1.093***
		(14.14)	(7.92)	(7.93)
SIZE		-0.260***	-0.322***	-0.321***
		(-5.71)	(-4.65)	(-4.65)
LTG		0.035***	0.040***	0.040***
		(9.46)	(11.63)	(11.63)
DISP		0.509***	0.271***	0.273***
		(5.68)	(3.72)	(3.72)
IDVOL		3.484***	1.324***	1.324***
		(7.53)	(3.79)	(3.80)
INTER				0.125
				(1.57)
INTRA				0.115**
				(2.08)
INTERCEPT	4.038***	2.500***	4.237***	4.037***
	(11.30)	(4.38)	(7.71)	(7.31)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	No	No
Industry FE	Yes	Yes	No	No
Firm FE	No	No	Yes	Yes
No. of obs.	45,164	45,164	45,164	45,164
Adj. R^2	0.253	0.421	0.579	0.579

Table 3. Pre-treatment Trends Analysis

This table presents the dynamic estimation results of the effect of banking competition on cost of equity. Following Cornaggia et al. (2015), we decompose each of the four components of the *RSINDEX* into four indicator variables associated with four periods around the deregulation year, namely all years up to three years prior to deregulation, two years preceding deregulation, two years following deregulation, and three years or more after deregulation. We then add up the four components of the *RSINDEX* to obtain $Before^{3+}$, $Before^{1,3}$, $After^{1,3}$, and $After^{3+}$. See Appendix A for variable definitions. All models include firm and year fixed effects. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable：Cost of Equity Mean R_{AVG}	
	(1)	(2)
$Before^{3+}$	-0.021	-0.025
	(-1.07)	(-1.16)
$Before^{1,3}$	0.030	0.022
	(1.52)	(1.01)
$After^{1,3}$	0.076**	0.052*
	(2.34)	(1.81)
$After^{3+}$	0.093***	0.053**
	(3.51)	(2.16)
Controls	No	Yes
Year FE	Yes	Yes
Firm FE	Yes	Yes
No. of obs.	45,164	45,164
Adj. R^2	0.533	0.579

Table 4. Falsification Test: Randomization of Bank Deregulation

This table presents the regression results of Eq. (1) with randomized state-level bank deregulation. The dependent variable is the implied cost of equity (R_{AVG}) calculated as the average of the four individual estimates. We randomly assign each state into a (pseudo) deregulation year following the original empirical distribution and construct a new *RSINDEX*. Other variable definitions are presented in Appendix A. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable：Cost of Equity Mean R_{AVG}	
	(1)	(2)
RSINDEX	0.021	0.004
	(0.75)	(0.11)
BETA	-0.045	0.027
	(-0.35)	(0.21)
ROA	-1.026***	-0.980***
	(-3.08)	(-3.02)
LEV	2.495***	1.854***
	(13.23)	(6.46)
BTM	1.818***	1.062***
	(10.77)	(5.51)
SIZE	-0.247***	-0.399***
	(-4.07)	(-5.62)
LTG	0.030***	0.033***
	(7.41)	(10.85)
DISP	0.283***	0.017
	(3.15)	(0.22)
IDVOL	3.505***	1.263***
	(8.12)	(3.49)
INTERCEPT	3.673***	5.759***
	(4.28)	(9.60)
Year FE	Yes	Yes
State FE	Yes	No
Industry FE	Yes	No
Firm FE	No	Yes
No. of obs.	45,164	45,164
Adj. R^2	0.400	0.579

Table 5. Propensity Score Matching and Difference-in-Difference Analysis

This table reports the results of the propensity score matching and difference-in-difference results. We match the control and treatment firms before deregulation on industry and all the control variables used in the baseline regression model, using a caliper width of 0.01 with the restriction of common support and no replacement. The treatment group consists of firms headquartered in states that deregulated in the test window. The control group consists of firms headquartered in states that have not deregulated in the test window. Both the treatment and control firms must have data available in at least one year around the deregulation. Panel A reports diagnostic statistics for the differences in firm characteristics between the treatment and control groups. Panel B reports the regression results based on the matched sample. *Treatment* is a dummy variable equal to one if the firm is headquartered in a state that deregulates, and zero otherwise. *Post* is a dummy variable equal to one in the years after bank regulation, and zero otherwise. See Appendix A for other variable definitions. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Diagnostics stat-difference in means of variables

	Treatment group		Control group		
Variables	N	Mean	N	Mean	T-STAT
BETA	2262	0.877	2262	0.89	0.83
ROA	2262	0.062	2262	0.063	0.69
LEV	2262	0.238	2262	0.238	0.03
BTM	2262	0.498	2262	0.504	0.62
SIZE	2262	6.761	2262	6.733	-0.59
LTG	2262	0.163	2262	0.16	-0.75
DISP	2262	0.088	2262	0.091	0.37
IDVOL	2262	0.264	2262	0.262	-0.35

Panel B. Regression with the propensity-score-matched samples

	(1)	(2)
Treatment × Post	1.000**	0.811**
	(2.48)	(2.14)
Treatment	-0.298*	-0.177
	(-1.80)	(-1.16)
Post	-0.712*	-0.410
	(-1.93)	(-1.17)
Controls	Yes	Yes
State FE	Yes	No
Industry FE	Yes	No
Firm FE	No	Yes
No. of obs.	4524	4524
Adj. R^2	0.229	0.227

Table 6. Robustness Checks

This table presents the regression results of robustness tests. Panel A presents the regression results with additional controls at the state level. Panel B presents the regression estimates from Eq. (1) using four individual cost of equity measures obtained from Gebhardt et al.'s (2001) model (R_{GLS}), Claus and Thomas's (2001) model (R_{CT}), Ohlson and Juettner-Nauroth's (2005) method (R_{OJN}), Easton's (2004) method (R_{MPEG}), as well as their median value (R_{MED}). To economize on space, all the control variables are suppressed. See Appendix A for other variable definitions. All models include state and year fixed effects. The numbers reported in parentheses are t-statistics based on standard errors clustered at the state level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Additional state-level controls

	Dependent Variable：Cost of Equity Mean R_{AVG}			
	(1)	(2)	(3)	(4)
RSINDEX	-0.048***	-0.045***	-0.051***	-0.047***
	(-3.12)	(-3.00)	(-3.17)	(-2.98)
GDPGROWTH	-0.155			-0.422
	(-0.22)			(-0.44)
GDPPERCAP		0.000		0.000
		(0.20)		(0.28)
POLBALANCE			-0.061	-0.064
			(-0.49)	(-0.44)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
No. of obs.	45164	38831	43921	37769
Adj. R^2	0.579	0.552	0.580	0.554

Panel B. Individual cost of equity measures

	(1)	(2)	(3)	(4)	(5)
	R_{GLS}	R_{CT}	R_{OJN}	R_{MPEG}	R_{MED}
RSINDEX	-0.063**	-0.032**	-0.052***	-0.040*	-0.053***
	(-2.40)	(-2.02)	(-2.88)	(-1.89)	(-3.25)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
No. of obs.	45164	45164	45164	45164	45164
Adj. R^2	0.617	0.540	0.497	0.511	0.569

Table 7. Banking Competition and Private Debt Covenants

This table presents the impact of banking competition on financial covenants in private debt contracts. We regress the total number of covenants and three different variables of covenant violation probability on *RSINDEX* and a set of control variables. Covenant variables are based on loan packages data from Dealscan database. Following Demerjian and Owens (2016), we define covenant violation probability as (1) annual average aggregate probability of covenant violation across all covenants included on a given loan package (*PVIOL*); (2) annual average aggregate probability of covenant violation across all performance covenants included on a given loan package (*PVIOL_PCOV*); and (3) annual average aggregate probability of covenant violation across all capital covenants included on a given loan package (*PVIOL_CCOV*). See Appendix A for other variable definitions. All models include firm and year fixed effects. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) Number of covenants	(2) PVIOL	(3) PVIOL_PCOV	(4) PVIOL_CCOV
RSINDEX	0.043***	0.009**	0.006*	0.004**
	(3.29)	(2.56)	(1.92)	(2.04)
CASH	-0.097	0.221***	0.219***	0.025
	(-0.53)	(4.53)	(4.73)	(0.86)
TANG	-0.382***	-0.061***	-0.103***	0.035***
	(-7.36)	(-4.48)	(-8.28)	(3.64)
CFLOW	0.624	-0.568***	-0.490***	-0.256***
	(1.55)	(-5.17)	(-4.78)	(-3.35)
R&D	-2.168***	-0.198	-0.403***	0.154
	(-4.32)	(-1.33)	(-2.84)	(1.46)
SIZE	-0.306***	-0.058***	-0.052***	-0.014***
	(-25.40)	(-17.90)	(-16.70)	(-6.87)
ROA	0.009	-0.647***	-0.664***	-0.035
	(0.03)	(-7.65)	(-8.23)	(-0.62)
LEV	0.794***	0.532***	0.499***	0.098***
	(7.11)	(17.33)	(16.40)	(4.83)
BVMV	-0.294***	0.034*	0.034*	-0.007
	(-4.31)	(1.83)	(1.81)	(-0.60)
INTERCEPT	4.812***	0.581***	0.501***	0.187***
	(40.02)	(13.20)	(11.82)	(6.10)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
No. of obs.	6781	5713	5713	5713
Adj. R2	0.174	0.199	0.193	0.053

Table 8. The Role of Lending Relationship

This table presents the results conditional on bank lending relationship. Our first proxy for lending relationship is the average distance between firms and their main lenders in 1998 at the two-digit SIC level, based on the National Survey of Small Business Finances in 1998. Following Bharath et al. (2011), we measure lending relationship strength as (1) the amount of relationship lending, defined as the annual average ratio of the facility value with the lead bank(s) to the total value of loans borrowed by the firm in the last five years, and (2) the number of relationship lending, defined as the annual average ratio of the facility number with the lead bank(s) to total number of loans borrowed by the firm in the last five years. We set three dummy variables, AVDIS_DUM, RELAMT_DUM, RELNO_DUM, as one for firms with below-median distance, above-median amount of relationship lending, and above-median number of relationship lending, respectively. See Appendix A for other variable definitions. All models include firm and year fixed effects. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable：Cost of Equity Mean R_{AVG}		
	(1)	(2)	(3)
RSINDEX	-0.010	-0.187***	-0.203***
	(-0.61)	(-3.17)	(-3.54)
AVDIS_DUM	0.159**		
	(2.51)		
*RSINDEX * AVDIS_DUM*	-0.066***		
	(-3.85)		
RELAMT_DUM		0.207**	
		(2.42)	
*RSINDEX * RELAMT_DUM*		-0.114**	
		(-2.60)	
RELNO_DUM			0.119
			(1.53)
*RSINDEX * RELNO_DUM*			-0.084*
			(-2.03)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
No. of obs.	39271	12237	12237
Adj. R2	0.365	0.475	0.475

Table 9. The Role of External Finance Dependence

This table presents the results conditional on external finance dependence. We set two dummy variables as one for above-median external financial dependence, bank loan ratio, and bank loan amount, respectively (EFD, LOANRATIO, and LNLOAN). See Appendix A for other variable definitions. All models include firm and year fixed effects. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable：Cost of Equity Mean R_{AVG}		
	(1)	(2)	(3)
RSINDEX	-0.036**	-0.042*	-0.038
	(-2.06)	(-2.00)	(-1.58)
EFD	0.271***		
	(4.96)		
*RSINDEX * EFD*	-0.029*		
	(-1.74)		
LOANRATIO		0.419***	
		(5.18)	
*RSINDEX * LOANRATIO*		-0.055**	
		(-2.53)	
LNLOAN			0.437***
			(5.24)
*RSINDEX * LNLOAN*			-0.060**
			(-2.30)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
No. of obs.	44409	45164	45164
Adj. R2	0.578	0.534	0.534

Table 10. The Role of Governance Mechanisms

This table presents the results conditional on governance mechanisms. We set three dummy variables as one for firms with an above-median G-index (GINDEX), below-median institutional ownership (INSOWN) and below-median analyst coverage (COVER), respectively. See Appendix A for other variable definitions. All models include firm and year fixed effects. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable：Cost of Equity Mean R_{AVG}		
	(1)	(2)	(3)
RSINDEX	-0.024	-0.018	-0.029*
	(-0.59)	(-0.86)	(-1.83)
GINDEX	0.126*		
	(1.98)		
*RSINDEX * GINDEX*	-0.043*		
	(-1.90)		
INSOWN		0.070	
		(1.19)	
*RSINDEX * INSOWN*		-0.048**	
		(-2.66)	
COVER			0.216***
			(3.90)
*RSINDEX * COVER*			-0.079***
			(-3.90)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
No. of obs.	13611	33033	45164
Adj. R2	0.310	0.332	0.370

Table 11. The Role of Firm Risk

This table presents the results conditional on firm risk. We set three dummy variables as one for firms with an above-median idiosyncratic volatility (IDVOL_DUM), above-median cashflow volatility (CF_VOL_DUM) and above-median earnings volatility (EARN_VOL_DUM), respectively. See Appendix A for other variable definitions. All models include firm and year fixed effects. The numbers reported in parentheses are *t*-statistics based on standard errors clustered by year. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable：Cost of Equity Mean R_{AVG}		
	(1)	(2)	(3)
RSINDEX	-0.013	-0.022	-0.022
	(-0.72)	(-1.12)	(-1.18)
IDVOL_DUM	0.021		
	(0.36)		
*RSINDEX * IDVOL_DUM*	-0.052**		
	(-2.75)		
CF_VOL_DUM		-0.020	
		(-0.43)	
*RSINDEX * CF_VOL_DUM*		-0.046**	
		(-2.63)	
EARN_VOL_DUM			-0.010
			(-0.21)
*RSINDEX * EARN_VOL_DUM*			-0.051***
			(-3.19)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
No. of obs.	45164	45164	45164
Adj. R2	0.579	0.580	0.580

Appendix A. Estimation of Cost of Equity Capital

Following previous research in cost of equity capital (e.g., Dhaliwal et al., 2016), we estimate the implied cost of equity (in percentages) based on the following four models. We first define the variables used in the following three models.

P_t^*: Implied market price of a firm's common stock at time t. We use the price in June following the latest fiscal year end to compute P_t^*.

B_t: Book value of equity from the most recent available financial statements at time *t*.

$FEPS_{t+i}$: Median forecasted earnings per share (EPS) from IBES or derived EPS forecasts for the next *i*th year at time *t*.

$POUT$: Forecasted dividends payout ratio. We use the ratio of the indicated annual dividends from IBES and $FEPS_{t+1}$ to measure the forecasted payout ratio. If $FEPS_{t+1}$ is negative, we assume a return on assets of 6% to calculate earnings. *POUT* is winsorized to be within 0 and 1.

(1) Gebhardt, Lee, and Swaminathan (2001)

$$P_t^* = B_t + \sum_{i=1}^{T-1} \frac{(FROE_{t+i} - R_{GLS}) \times B_{t+i-1}}{(1+R_{GLS})^i} + \frac{(FROE_{t+T} - R_{GLS}) \times B_{t+T-1}}{(1+R_{GLS})^{T-1} R_{GLS}}. \qquad \text{(A-1)}$$

We use IBES analysts' earnings per share forecasts (FEPS) to proxy for the market expectation of a firm's earnings for the next 3 years. We measure FEPS by assuming that the future return on equity (FROE) declines linearly until it reaches an equilibrium ROE from the 4th year to the *T*th year. We assume that T = 12. This equilibrium ROE is measured by a historical, 10-year, industry-specific median return on equity. ROE is defined as the income available to common shareholders (*ibcom*) scaled by the lagged total book value of equity (*ceq*). We classify all firms into the Fama-French 48 industries. Firm-year observations with a negative ROE are excluded from our sample. Future book values are estimated by assuming a clean surplus relation ($B_{t+1} = B_t + EPS_{t+1} - DPS_{t+1}$), where the future dividend, DPS_{t+1}, is calculated by multiplying EPS_{t+1} by POUT.

(2) Claus and Thomas (2001)

$$P_t^* = B_t + \sum_{i=1}^{5} \frac{(FROE_{t+i} - R_{CT} \times B_{t+i-1})}{(1+R_{CT})^i} + \frac{(FROE_{t+5} - R_{CT} \times B_{t+4}) \times (1+g_{lt})}{(R_{CT} - g_{lt})(1+R_{CT})^5}. \qquad \text{(A-2)}$$

We use IBES earnings forecasts to estimate the abnormal earnings for the next 5 years. Earnings forecasts for the future 4th and 5th years are derived from earnings forecasts for the 3rd year and the long-term earnings growth rate. If the long-term earnings growth rate is missing from IBES, then an implied earnings growth rate from EPS_{t+2} and EPS_{t+3} is used. The long-term abnormal earnings growth rate is calculated using the contemporaneous risk-free rate (the yield on 10-year Treasury bonds) minus 3%.

(3) Ohlson and Juettner-Nauroth (2005) and implemented by Gode and Mohanram (2003)

$$R_{OJN} = A + \sqrt{A^2 + \left(\frac{E_t(EPS_{t+1})}{P_t^*}\right)(g_2 - g_{lt})}, \qquad \text{(A-2)}$$

where

$$A = 0.5\left(g_{lt} + \frac{DPS_{t+1}}{P_t^*}\right).$$

and where g_2 is the average of the short-term earnings growth rate implied in EPS_{t+1} and EPS_{t+2} and the analysts' forecasted long-term growth rate. The implementation of this model requires that

$EPS_{t+1}>0$ and $EPS_{t+2}>0$. g_{lt} is calculated using the contemporaneous risk-free rate (the yield on 10-year Treasury bonds) minus 3%.

(4) Modified PEG ratio model by Easton (2004)

$$P_t^* = \frac{E_t(EPS_{t+1})}{R_{MPEG}} + \frac{E_t(EPS_{t+1})E_t[g_{st} - R_{MPEG} \times (1 - POUT)]}{R_{MPEG}^2}. \tag{A-2}$$

where the variables are defined as those in other models of cost of equity capital.

Appendix B. Variable Definition

Variables	Descriptions
Implied cost of equity measures	
R_{GLS}	Implied cost of equity estimate (in percentages) derived from the Gebhardt et al. (2001) model minus the yield on 10-year Treasury bonds.
R_{CT}	Implied cost of equity estimate (in percentages) derived from the Claus and Thomas (2001) model minus the yield on 10-year Treasury bonds.
R_{OJN}	Implied cost of equity estimate (in percentages) derived from the Ohlson and Juettner-Nauroth (2005) model minus the yield on 10-year Treasury bonds.
R_{MPEG}	Implied cost of equity estimate (in percentages) derived from the Easton (2004) model minus the yield on 10-year Treasury bonds.
R_{AVG}	Average value (in percentages) of R_{GLS}, R_{CT}, R_{OJN}, and $R_{MPEG.}$
R_{MED}	Median value (in percentages) of R_{GLS}, R_{CT}, R_{OJN}, and $R_{MPEG.}$
Deregulation and control variables	
RSINDEX	Rice-Strahan index of interstate banking deregulation based on Rice and Strahan (2010), ranging from zero (the most open stance) to four (the most regulated stance) based on regulation changes in a state.
BETA	Beta risk is estimated by regressing daily individual stock returns over the fiscal year on the contemporaneous CRSP value-weighted market returns.
ROA	Income before extraordinary items (*ib*) divided by total assets (*at*).
LEV	Financial leverage, defined as the book value of long-term debt (*dltt*) plus book value of debt in current liabilities (*dlc*) divided by book value of assets (*at*).
BTM	Book value of equity (*ceq*) divided by market value of equity.
SIZE	The market value of equity at the end of the fiscal year (*prcc_f*csho*, in $millions).
LTG	The median analyst forecast of the long-term earnings growth rate.
DISP	Dispersion of analyst forecasts, defined as the standard deviation of the analysts' estimates for the next period's earnings divided by the consensus forecast for next period's earnings.
IDVOL	The annual volatility of the residuals of the firm's stock returns regressed on the CRSP value-weighted stock market portfolio return.
Other variables	
$Before^{1}$	A variable that takes the value of $1\times(\Delta RSINDEX_t)$ the year prior to a regulatory change and zero otherwise. $\Delta RSINDEX_t$ is the change in $RSINDEX_t$ during a deregulatory event.
$Before^{2+}$	A variable that takes the value of $1\times(\Delta RSINDEX_t)$ from the beginning of the window up to two years prior to a regulatory change and zero otherwise.
$After^{2+}$	A variable that takes the value of $1\times(\Delta RSINDEX_t)$ in the second year following a deregulation until the end of the window and zero otherwise.
$After^{1}$	A variable that takes the value of $1\times(\Delta RSINDEX_t)$ in the year following a regulatory change and zero otherwise.
INTRA	An indicator variable that takes the value of one from the year of intrastate deregulation onward as described in Jayaratne and Strahan (1996).
INTER	An indicator variable that takes the value of one from the year of interstate deregulation onward as described in Black and Strahan (2002).

GDPGROWTH	GDP growth measured as state-level GDP percent change (source: Bureau of Economic Analysis).
GDPPERCAP	GDP per capita measured as state-level GDP over state-level population (source: Bureau of Economic Analysis).
POLBALANCE	Political balance measured as state-level fraction of the members of the House of Representatives from the Democratic Party in the current year.
PVIOL	Aggregate probability of covenant violation across all covenants included on a given loan package as described in Demerjian and Owens (2016).
PVIOL_PCOV	Aggregate probability of covenant violation across all performance covenants included on a given loan package as described in Demerjian and Owens (2016).
PVIOL_CCOV	Aggregate probability of covenant violation across all capital covenants included on a given loan package as described in Demerjian and Owens (2016).
AVDIS_DUM	A dummy variable set to one for industries with below-median distance from the main lender and zero otherwise. The data on average distance from the main lender by two-digit SIC industry is obtained in the 1998 survey.
RELAMT_DUM	A dummy variable set to one for firms with above-median amount of relationship lending, which is defined as the annual average ratio of the facility value with the lead bank(s) to the total value of loans borrowed by the firm in the last five years.
RELNO_DUM	A dummy variable set to one for firms with above-median number of relationship lending, which is defined as the annual average ratio of the facility number with the lead bank(s) to total number of loans borrowed by the firm in the last five years.
EFD	A dummy variable set to one for industries with above-median industry average external finance dependence and zero otherwise. As reported in Rajan and Zingales (1998), external financial dependence ratio is defined as investment (capital expenditure (*capx*) + R&D expenses (*xrd*) + acquisitions using cash (*aqc*)) minus operating income before depreciation (*oibdp*), divided by investment.
LOANRATIO	The amount of cumulative bank loan scaled by the total assets (at) in year *t* (source: DealScan).
LNLOAN	The natural logarithm of the amount of cumulative bank loan in year *t* (source: DealScan).
GINDEX	A dummy variable that takes one for firms with an above-median G-index, and zero otherwise. G-index is developed by Gompers et al. (2003).
INSOWN	A dummy variable that equals one for firms with below-median institutional ownership, and zero otherwise.
COVER	A dummy variable that equals one for firms with below-median analysts following.
IDVOL_DUM	A dummy variable that equals one for firms with above-median idiosyncratic volatility, and zero otherwise.
CF_VOL_DUM	A dummy variable that equals one for firms with above-median cashflow volatility, and zero otherwise. Cashflow volatility is defined as the standard deviation of the ratio of cash flows to total assets during the past three years.
EARN_VOL_DUM	A dummy variable that equals one for firms with above-median earnings volatility, and zero otherwise. Earnings volatility is defined as the standard deviation of the ratio of earnings, excluding extraordinary items and discontinued operations, to lagged total equity during the past three years.