How Does Institutional Ownership Affect Bank Loan Pricing: Evidence from a Regression Discontinuity Design*

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Job Market Paper

November 1, 2013

*I am greatly indebted to my committee, Anand Srinivasan (Chair), David Reeb, Nagpurnanand Prabhala, for their feedback and guidance. I thank the participants of several NUS seminar, whose comments have greatly improved the paper. All errors are mine. Any comments or suggestions are welcomed.

Abstract

Using the Russell Index 1000 inclusion/exclusion as the discontinuity design setting, I find a causal effect of institutional ownership (IO) on bank loan pricing. Specifically, I find that an exogenous positive shock in institutional ownership appears to only affect the pricing term of bank loans but not the non-pricing terms. On average, a 35 % increase in IO will lead to a 29 bps lower loan spread which is about 1/5 of the average spread. However, the non-pricing terms such as collateral, maturity, and covenants do not change with the increase in IO. The reduction in loan spread is supported by the evidence that firms with high IO will have lower credit risk measured by expected default frequency using Merton model. Also, this effect is weaker for the family firms. Further investigation reveals that increase in liquidity and direct monitoring from institutional investors could be the channels through which institutional ownership affects bank loans pricing. Moreover, although the cost of bank loan is lower for firms with higher institutional ownership, these firms do not borrow more frequently than those with lower institutional ownership.

1 Introduction

The syndicated loan market has become the most important source of global corporate financing over the past 20 years. In year 2009, the size of international syndicated loan market reached a record high of \$1.8 trillion, which is even larger than the international bond markets with a size of \$1.5 trillion (Chui, Domanski, Kugler, and Shek, 2010). Therefore, it is of immense economic significance to understand the factors that affect the cost of bank loan given the size of the syndicate loan market.

In this paper, I focus on how institutional ownership (IO hereafter) of stocks of a borrowing firm influences its bank loan pricing. Institutional investors own a significant proportion of public equity in the US stock market. The institutional equity ownership increases dramatically in the past decades, from 10% in the 1970s to more than 60% nowadays. This dramatic change in institutional ownership is believed to have great impact on the corporate governance structure of company. As suggested in Shleifer and Vishny (1997), corporate governance is an important channel through which suppliers of capital to corporation assure themselves of getting a return on their investment. While the impact of governance on cost of debt has received recent attention in several papers (Bhojraj and Sengupta, 2003; Klock, Mansi, and Maxwell, 2005; Anderson, Mansi, and Reeb, 2003; Cremers, Nair, and Wei, 2007; Chava, Livdan, and Purnanandam, 2009; Roberts and Yuan, 2010), few papers have examined the impact of institutional ownership on bank loan contract terms. This paper studies this topic, specifically focusing on the causal effect of institutional ownership on bank loan contract terms.

Theoretically, the net impact of institutional ownership on debtholders is unclear. On one hand, the involvement of institutional investors in monitoring has the potential to reduce agency problems, which in turn will increase shareholders' value and benefit debtholders. Institutional investors may also discipline managers through shareholder activism or the threat of exit (Gillan and Starks, 2007; Edmans, 2009; Admati and Pfleiderer, 2009; Edmans and Manso, 2011). Also, ownership by institutions may reduce coordination costs (Grossman and Hart, 1980; Shleifer and Vishny, 1986) and can lower agency costs through economies of scale in delegated monitoring. On the other hand, debtholders' concern of asset substitution might be heightened with higher IO (Jensen and Meckling, 1976). Stronger shareholder control better aligns management and shareholders, which may lead to wealth transfer between shareholders and debtholders (e.g. through more dividend payout). Therefore, it is ultimately an empirical issue to test the effect of IO on bank loan pricing.

Empirically, it is a challenging task to establish the causal relation between IO and bank loan pricing. While institutional ownership may cause differences in bank loan pricing, the institutional investors may also choose stocks because of some unobservable firm characteristics that drive the bank loan pricing as well.

My empirical strategy to test the causal effect of institutional ownership on bank loan pricing utilizes a regression discontinuity design around the Russell 1000 and Russell 2000 index cut-off.[1] Specifically, all the eligible securities are ranked based on their market capitalization on the last trading day in May each year. The first 1000 largest stocks will be included in the Russell 1000 Index and stocks with rank from 1001th to 3000th will be included in Russell 2000 index. The breakpoint of Russell Index 1000/2000 is the rank of 1000th. Therefore, mechanically, those just-included stocks and just-excluded stocks in Russell 1000 Index are very similar in terms of the market capitalization. However, since both Russell 1000 and 2000 index are market value weighted index, the stocks just-included and just-excluded in Russell 1000 will get quite different weight in the index respectively. Interestingly, stocks with smaller market capitalization will be included at the top of Russell 2000 index and have a large weight, because they are compared to other smaller stocks in Russell 2000 index. In contrast, the stocks at the bottom of Russell 1000 index will have a small weight, because they are compared to other large stocks in Russell 1000 index. Combining with the fact that Russell 2000 index is much more popular in the mutual fund industry,

[1] Chang and Hong (2012) are the first to exploit this discontinuity and find that the smaller firms that are just included in the more popular Russell 2000 index experience higher returns right after the reconstitution of the index, which the authors attribute to price pressure due to higher institutional demand for the Russell 2000 stocks.

there is a significant jump in institutional ownership at the cutoff point (i.e., 1000th rank). Therefore, I can employ a regression discontinuity approach to investigate the impact of the jump in institutional ownership on bank loan pricing. To the extent that the exclusion restriction is valid, I can investigate how other variables of interest such a loan spread, maturity, collateral, and covenants behave around the cut-off point (i.e., 1000th rank). I then can make causal inferences and calculate how the dependent variables of interest respond to a given shock in institutional ownership.[2]

My main finding is that the exogenous positive shock in institutional ownership of a stock caused by the index inclusion/exclusion affects the pricing of bank loans in a significant manner. On average, a 35% increase in IO will lead to 29 bps lower loan spread which is about 1/5 of the average spread. However, non-pricing terms such as collateral, maturity, and covenants do not change with the increase in IO. This evidence is supported by the fact that firms with higher IO have a lower credit risk which is measured by expected default frequency using Merton model.

I also examine additional channels by which an increase in IO may affect bank loan pricing. One potential channel is an increase in liquidity. I find that the liquidity, using Amihud measure, is 10% higher for the firms just-excluded in the Russell 1000. An increase in liquidity may have two effects on credit risk. One effect is that it can facilitate the exercise of corporate control because it allows large shareholders to emerge to correct managerial failure (Maug, 1998). It may also increase the liquidity fading by these institutional investors and discipline the managers by "threat to exit" or "treat of governance" (Edmans, 2009). Therefore, the liquidity improvement will add value to the firm and this benefit is shared with debtholders. The other effect is that increase in liquidity may also lower the expected return of the firms and further directly lower the credit risk of firms given that the firm's fundamentals stay the same.

Another potential channel through which IO may affect bank loan pricing is the actual

[2]More detail will be discussed in section 2.

monitoring effort by institutional investors. The proxy-voting participation for just-excluded firms is higher by 45 percentage points than just-included firms. Therefore, firms with higher IO do have higher participation rate than the firms with lower IO. Another supporting evidence is that there are jumps in holding for most types of institutional investors such as public pension funds, bank trust. Large institutional shareholders (notably CalPERs and other public pension funds) are known for their involvement in governance-related activities. Therefore, increase in public pension funds' holding may mitigate the agency problem. Taken together, these evidences demonstrate that firms with higher institutional ownership could be monitored better by institutional investors. The benefit from better alignment between the manager and shareholders may spillover to the debtholders.

I further investigate the cross-sectional difference of the effect of IO on bank loan pricing across family and non-family firms. I find that the results are weaker for the family firms, suggesting that the benefits of additional monitoring are lower when a controlling shareholder is already present in the firm.

I also find that, although the cost of bank loan is lower for the firms just-excluded from Russell 1000, they do not borrow more frequently relative to the just-included firms.

Last, I conduct several robustness tests to address the concern of randomness and to check whether our results are sensitive to methodological choices. My results are robust to alternative methodologies such as different nonparametric form or bandwidth choice. I also do the placebo tests by picking 600th, 800th, 1200th, and 1400th ranks as the cutoff points. The results show that there is no significant effect at these random thresholds, which suggests that the main results in this paper are not picking up a random pattern in the sample.

Focusing on how institutional ownership causally influences the bank loan pricing, this paper contributes to the emerging literature on the role of corporate governance on cost of debt. Chava et al. (2009) find that lenders demand a premium from borrowers with shareholder-friendly managers. While their paper focuses on the effect of takeover risk as the mechanism of corporate governance on cost of bank loan, my paper focuses on the institutional ownership as the mechanism of corporate governance. This paper also complements the results in Cremers et al. (2007) and Bhojraj and Sengupta (2003). While both papers focus on the bond return, this paper studies the causal effect of institutional ownership on bank loan. Loan market is different from bond market in the following aspects. First, bondholders do not have incentive to monitor the firms due to the free-rider problem. In contrast, banks are generally regarded as the insider of the firms. Therefore, although higher institutional ownership would lead to lower bond yield, it is unclear whether the increase in shareholder monitoring will lower the cost of bank loan given that banks already exert their own monitoring effort. Second, bank loans are informationally more efficient than publicly traded bonds, because they are priced by the experienced loan officers with in-depth knowledge of the firms (e.g. (Altman, Gande, and Saunders, 2010)). Therefore, bank loan market could be a better setting to investigate the effect of institutional ownership on the cost of debt.

The rest of paper is organized as follow: Section 2 discusses the data and empirical strategies. Section 3 shows the main empirical results. Section 4 explores the channels through which the IO affects bank loan pricing. Section 5 presents the robustness checks. Section 6 concludes.

2 Data and Empirical Strategy

Russell U.S. index captures 99% of the U.S. equity market and 100% of the investable U.S. market. The indexed stocks need to be traded on a major U.S. exchange, with its headquarter in U.S. or asset primarily in US, or revenues from US. The membership is then determined by the market capitalization at the last trading day in each May. Common stock, non-restricted exchangeable shares and partnership units/membership interests (in certain cases) are used to calculate a company's total market capitalization. If multiple share classes of common stock exist, they are combined together. In cases where the common stock share classes are independently from each other (e.g., tracking stocks), each class is considered for inclusion separately.

One important characteristic of the Russell indices is that these indices are transparent and easy for managers to construct by themselves, in contrast to the black box approach of the S&P 500 index. This transparency has resulted in its popularity among a significant fraction of mutual fund managers. During annual reconstitution, the closing price on the last trading day in May on the primary exchange is used to determine market capitalization. If a security does not trade on its primary exchange, the lowest price from another major US exchange is used. In the case where multiple share classes exist, a primary trading vehicle is determined, and the price of that "primary trading vehicle" (usually the most liquid) is used in the calculation. The impact of rebalance of Russell index is huge given its popularity. For example, according to Nasdaq, approximately $687.9 million shares representing $9.5 billion in value were traded in the closing 1.15 seconds on last trading day of June across the nearly 2,200 Nasdaq-listed stocks in 2012.

I obtain the annual constituents list for the Russell 1000 and Russell 2000 from Russell Investments for the sample period of 1990 to 2006. The sample period stops at 2006 because after that Russell Company imposes a flexible band policy. Specifically, firms may stay in the prior year index if its market value is close to the cut-off point market capitalization. Therefore, I only use the sample before 2007 in order to obtain a clean setting. However, my result is qualitative the same if I include the observations after year 2006.

The validity of regression discontinuity design relies on the randomness of the index membership assignment around the cutoff points. In this setting, the just-included and just-excluded from Russell 1000 index is random, which leads to a jump in institutional ownership. According to "Russell U.S. Equity Indexes Construction and Methodology" [3] , all the eligible securities are ranked by their total market capitalization on the last trading

[3] More detail can be found at http://www.russell.com/Indexes/

day in May each year. The largest 1000 stocks are included in Russell 1000 Index and the 1001th to 3000th largest stocks are included in the Russell 2000 Index. The breakpoint of Russell Index 1000/2000 is the rank of 1000th. Therefore, mechanically, those just-included and just-excluded stocks in Russell 1000 Index are very similar in terms of the market capitalization and so the assignment to the left or right of the index threshold is essentially random. Stocks with smaller market capitalization will be included at the top of Russell 2000 index and have large weights, because they are compared to other smaller stocks in Russell 2000 index. In contrast, the stocks at the bottom of Russell 1000 index will have small weights, because they are compared to other large stocks in Russell 1000 index. Figure 1(a) demonstrates the continuity in market capitalization and Figure 1(b) demonstrates the discontinuity in weight. Combining with the fact that Russell 2000 index is much more popular in the mutual fund industry, there is a significant jump in institutional ownership at the cutoff point (1000th rank).

Therefore, I can employ a regression discontinuity approach to investigate the impact of the jump in institutional ownership on bank loan pricing. To the extent that the exclusion restriction is valid, I can investigate how other variables of interest such a loan spread, maturity, collateral, and covenants behave around the cut-off point (i.e., 1000th rank). I then can make causal inferences and calculate how the dependent variables of interest respond to a given shock in institutional ownership.

Indeed, I show that the just-excluded stocks in Russell 1000 index have discontinuously higher institutional ownership compared to the just-included stocks. Discontinuity plots with some data smoothing and break tests proposed by Lee and Lemieux (2010) are shown in Figure 2(a). The plots of institutional ownership after the reconstitution month of June show the dramatic discontinuity. The difference in institutional ownership, a proxy for demand by institutions between the just-included versus the just-excluded stocks is around 35%. The mean institutional ownership percentage in the sample is 60%. So the difference is about one-half of this mean, which is a sizable increase. This finding verifies the premise of the experiment that there is a significant difference in demand for stocks at the bottom of the Russell 1000 and for stocks at the top of Russell 2000 index .

The empirical strategy I employ here is to fit the linear function for the stocks around the cut-off point. Specifically, I run the linear regression around the cutoff rank 1000th:

$$Y = \alpha + \beta_1 * R2000 + \beta_2 * |Rank| + \beta_3 * |Rank| * R2000 + Year_i + \epsilon, \quad (1)$$

where for $|Rank| < Bandwidth$, R2000 is a dummy variable that equals 1 if the stocks are in Russell 2000 index, Rank is the relative rank from the 1000th rank with negative denoting that stocks in Russell 1000 index and positive number denoting stocks in Russell 2000 index, and $Year_i$ are the year dummies. Bandwidth is the number of firms in each side of cutoff points. Year dummies are included in all regressions.

I choose the bandwidth $Bandwidth = 100$ for most of my tests. Essentially, the choice of bandwidth faces a trade-off between testing power and accuracy. Larger bandwidth will have higher testing power but lower accuracy for including observations that have low predicting power. I choose 100 as the bandwidth for the following reasons: first, the choice of bandwidth has great impact on the estimation result. Rule-of-thumb (ROT) bandwidths for different interest variables are about 80-200 for each side. I conservatively use the same bandwidth for all variables of interest as our baseline results and put more results on different choice of bandwidths in the robustness check. Second, about a half of firms in the (-100, 100) bandwidth have loans information in our sample. Therefore, 100 firms on each side of the cutoff point is reasonable to get enough testing power; In the robustness checks, I also try the Rule-of-thumb (ROT) bandwidth and try to fit the function using local polynomial with couples of variation. The results are qualitatively the same. See section 5 for detail discussion.‘

3 Empirical results

In this section, I report the empirical results of discontinuity tests in IO and loan contract terms.

3.1 Discontinuity Test for Institutional Ownership

In this subsection, I test whether there is a discontinuity in institutional ownership.

As suggested in Lee and Lemieux (2010), I plot the discontinuity in institutional ownership with some data smoothing. Results are shown in Figure 2. In Figure 2(a), I plot average institutional ownership (in 10 rank "bins" for smoothness) relative to the Russell 1000/2000 threshold. The X-axis represents the distance from the Russell 1000/2000 threshold where 0 represents the smallest firms in the Russell 1000, negative numbers represent larger firms away from the last Russell 1000 rank while positive numbers represent smaller firms just away from the first Russell 2000 index rank.

I further decompose the IO into groups based on their expected investment horizon using the classification method developed by Bushee (1998). I classifies institutions into three groups (i.e., dedicated, quasi-indexer, and transient), based on their past investment patterns in the areas of portfolio turnover, diversification, and momentum trading. "Transient" investors have high portfolio turnover and highly diversified portfolio holding. "Dedicated" investors have large average investments in portfolio firms and extremely low turnover. "Quasi-indexers" investors have diversified holdings and low turnover. Figure 2(b) to Figure 2(d) show that both the transient IO and "Quasi-indexer" IO have significant jumps for just-included Russell 2000 stocks. The jump is about 10% for transient IO and 25% for the quasi-indexer IO. Meanwhile, there is no significant jump for the dedicated IO. This suggests that the difference in demand between the just-excluded and just-included stocks mainly come from the indexer which is obvious because they benchmark to the index and the active traders.

I also decompose the IO based on the types of institutional investors from CDA/ Spectrum database, following Bushee (1998). I combine the CDA type 3 (investment company) and type 4 (independent investment advisor) into one group. In addition, I dig deeper to distinguish the ESOPS, university and foundations endowments, and private/public pension funds. Earlier research on shareholder activism (e.g., Guercio and Hawkins (1999)) shows that public pension funds pursue a highly active role in the governance of companies principally through the submission of shareholder proposals. Figure 3(a) to Figure 3(f) show that there is a significant jump for public pension fund holding for just-excluded Russell 1000 stocks. The jump in institutional ownership is from around 0.8% to 2.8%. I also observe jumps for investment company holding and bank trust holding. However, I do not observe any significant jumps for corporate pension fund holding, insurance company holding, or university and foundation fund holding.

Overall, I observe a significant jump in IO at cutoff point and this jump is concentrated in quasi-indexer (3/4 of overall jump) and transient investors (1/4 of overall jump) but not dedicated investors. I also find a significant jump in public pension fund holding, bank trust holding and investment company holding.

3.2 Discontinuity Test for Bank Loan Contract Terms

In this subsection, I test whether there is any discontinuity in bank loan contract terms. I investigate the bank loans borrowed by the firms within 1 year after index membership assignment (i.e., from July to next year June). Since the membership assignment is mechanical and creates the exogenous shock to the institutional demand, the difference of loan contracts for the just-excluded and just-included stocks could be attributed to the shock of the institutional ownership. This enables me to identify the causal effect of institutional ownership on bank loan contract. Loan spread is the all-in-drawn spread. Collateral is a dummy variable that equals one if the loan facility has collateral requirement. Maturity is the length of loan lending in month. Covenants is the number of distinct financial and general covenants. I first plot the mean loan spread, maturity, collateral, and covenants across all years over 10 rank intervals for 100 bins to the left of the threshold and for 200 bins to the right of the threshold. The X-axis represents the distance from the Russell 1000/2000 threshold where 0 represents the smallest firms in the Russell 1000, negative numbers represent larger firms away from the last Russell 1000 rank while positive numbers represent smaller firms just away from the first Russell 2000 index rank. The graph shows a clear discontinuity in loan spread at the threshold but no significant discontinuity for collateral, maturity, or covenants.

Table 2 reports the formal discontinuity tests for IO and bank loan contract terms using Equation 1. I use the OLS for IO, loan spread, and maturity regression, Logit regression for collateral, and Poisson regression for covenant. Columns 1 reports the difference of IO is about 35% at the cutoff point and is statistically significant at the 1% level. Column 2 shows that the difference in loan spread at the discontinuity is equal to 29 bps and is statistically significant at the 1% level. Combining with the fact that the average spread for loans around the cut-off point is 150bp, this represents a 20% reduction in spread, which is economically significant. Columns 3-5 show the result for collateral, maturity, and covenants. None of the above variables are statistically significant. Combining together, the result suggests that the institutional ownership only affects the pricing term of loan contract but not the non-pricing terms. Column 5 shows the result for discontinuity test for credit risk. Essentially, the loan pricing reflects the credit risk of the firms. Following Merton distance to default model, I use the expect default frequency (EDF) as my measure of credit risk. For each firm, I calculate the monthly average EDF during year T July to year T+1 May. I find that firms just-included in Russell 2000 have lower average EDF and it is statistically significant at 1% level. This evidence supports the previous finding that firms just included in Russell 2000 will enjoy lower loan spread compared to firms just excluded in Russell 2000.

As the main robustness test, I only use the sample of firms switching between Russell 1000 and Russell 2000. Only the switching year and the year before switching will be included in the sample. For example, firm A was in Russell 1000 during 1990-1995, and switched to

Russell 2000 during 1996-2006. I only use loans issued to firm A in year 1995 and 1996 for my analysis. Also, I require that the switcher must stay in the (-100, 100) band both before and after the switching. This is a conservative sample to asure there is no significant change in firm fundamentals when firms switch between indices. I compare the loan contract terms for the same firms in these 2 years. Specifically, I run the firm fixed-effect regression for this subsample and control for the year fixed effect.

$$Y = \alpha + \beta_1 * R2000 + Year_i + Firm_i + \epsilon, \quad (2)$$

where R2000 is a dummy variable that equals 1 if the stocks are in Russell 2000 index, $Firm_i$ are the firm dummies, and $Year_i$ are the year dummies.

I use the OLS for spread and maturity regression, Logit regression for collateral, and Poisson regression for covenant. The result is robust to the includsion/excludsion of the year dummies, loan purpose dummies (e.g. working capital/general purpose, etc.), and/or loan type dummies (e.g. term loan/credit line etc.). Overall, there are 220 switchers (189 unique firms) switching within the (-100, 100) widows in our sample. 98 unique firms get loans, among which 56 unique firms get loans both before and after the switch. Table 3 shows the regression results. First five columns report the OLS regression results for loan spread, collateral, maturity, and covenants respectively. Spread reduction is about 40 bps for the firms switched from Russell 1000 to Russell 2000. Compared to the regression discontinuity design test, the estimated sign is the same and the magnitude is larger (29 bps for RDD) for loan spread regression. This could be due to small sample of the switchers. Moreover, the switch does not affect other contract terms (collateral, maturity, and covenants) and none of them is statistically significant. This is consistent with the results in RDD test.

Next, I investigate the cross-sectional difference of the effect of IO on loan pricing. Table 4 reports this set of tests. First column investigates whether this effect is stronger for the firms close to distress. I sort firms based on distress risk measured by the expected default frequency (EDF). I divide the sample into high and low distress risk sub-sample using the median of EDF at the end of May across all years. I find that firms with high distress risk enjoy lower loan spread after getting an exogenous shock in IO.

In second column of Table 4, I investigate whether the family firms would benefit less from the increased institutional ownership. Family firms are regarded as having incentive structures that result in fewer agency conflicts between equity and debt claimants (Anderson et al. 2003). I find that the effect is weaker for the family firms, suggesting that the benefits of additional monitoring are lower when a controlling shareholder is already present in the firm.

Last, I test whether firms with higher IO are more likely to borrow from banks since they enjoy lower cost of debt. I find that the likelihood of borrowing is quite similar. The result is reported in Figure 5 and this test is suggested in McCrary (2008). There is no evidence that the firms with higher IO will borrow more frequently.

Taken together, these results point to a causal effect of institutional ownership on the pricing of bank loans but no effect on non-pricing terms of loan. Firms with higher IO will have lower cost of bank loan. This is supported by the finding that firms with high institutional ownership will have lower credit risk. In the next section, I explore the channels through which institutional investors affect pricing of bank loan.

4 Potential channel

In this section, I test the channels through which institutional ownership may potentially affect loan pricing.

4.1 Liquidity increase

In this subsection, I test whether firms with higher institutional ownership will increase the liquidity of stocks. An increase in liquidity may have two effects on credit risk. One effect is that it can facilitate the exercise of corporate control because it allows large shareholders to emerge to correct managerial failure (Maug, 1998). It may also increase the liquidity fading by these institutional investors and discipline the managers by "threat to exit" or "treat of governance" (Edmans, 2009). Therefore, the liquidity improvement will add value to the firm and this benefit is shared with debtholders. The other effect is that increase in liquidity may also lower the expected return of the firms and further directly lower the credit risk of firms given that the firm's fundamentals stay the same.

Generally, more involving institutional investors will increase the liquidity of the stocks and enable more and faster information incorporated into the stock price. This is supported by the analysis of subtypes of institutional ownership, I find that only the transient institutional shareholders and quasi-indexers (relaxing short sale constraint) will increase the holding in Russell 2000, but not the dedicated investors. Using the RDD, I find that the liquidity is 10 percentage higher for the firms that are just included in the Russell 2000. The result is presented in Table 5 column 1. This result is consistent with the literature suggesting that institutional investors increase the stock liquidities.

4.2 Monitoring effort by institutional investors

In this subsection, I test whether, besides the theoretical argument, firms with higher institutional ownership will be monitored more by institutional investors. Generally, the predictions stem from the idea that monitoring by institutional investors may have spillover effect from shareholders to debtholders. Therefore, higher institutional ownership firms will enjoy the lower loan spread.

Following Crane, Michenaud, and Weston (2012), I collect data from ISS Risk Metrics Shareholders Proposal and Vote Results database. I measure proxy-voting participation at the firm level in the fiscal year following the index inclusion. The results are presented in Table 5 column 2. The proxy-voting participation for just-excluded firms is higher by 45 percentage points than just-included firms. Therefore, firms with higher IO do have higher participation rate than the firms with lower IO.

I admit that the proxy-voting participation rate is not a perfect measure for the institutional investors' monitor effort, for institutional investors could outsourcing shareholder voting to proxy advisory firms such as ISS and Glass Lewis. Therefore, the increase in the voting rate is increasing mechanically. In this sense, the monitoring work is fulfilled by the proxy advisory firms but, at least, the higher institutional ownership make the coordination to vote for/against the proposal easier. Moreover, the increase in the voting rate is higher than the increase in IO, which suggests that the expanded voting pool includes not only new institutional investors but also the pre-existing institutional investors.

5 Robustness Check

In this section, I conduct several robustness tests to address the concern of randomness and to check whether our results are sensitive to methodological choices.

5.1 Public float adjustment by Russell

After the membership of the stocks are determined, the actual index weights are adjusted by Russell company based on the investable shares. The investible shares data are considered proprietary by Russell and not available to the public. This adjustment may reduce the randomness of the membership assignment. For example, large market capitalization firms with small investiable shares would stay at the bottom of Russell 1000. These firms are not comparable to the firms on the top of Russell 2000 with similar investiable market capitalization but much smaller market capitalization. To eliminate the firms with large adjustment made by Russell, following Crane et al. (2012), I calculate the percent difference between the unadjusted weight using CRSP market capitalization and the adjusted weight reported by Russell. I drop observations in the top 5% of squared percent difference. In this way, I remove the stocks that have large weight adjustment from the sample. The results are qualitatively the same for the sample of excluding the 5% of observations with large adjustments.

5.2 Manipulation

Another concern with this design is that some firms may have incentives to manipulate their index membership for the expected reduction in financing cost. Such manipulation would lead to self-selection and affect my causal inferences. I argue that this is unlikely for the following two reasons. Firstly, since the smaller firms will be included in Russell 2000 index and enjoy the reduction in spread, firms need to short sell stocks to push down the stock price. However, the stock price will go up after the firms are included in Russell 2000 and the short position will suffer a loss, which may reduce the incentive to manipulate the index inclusion. Secondly, the ranking is only decided by the closing market capitalization at the last trading day in May. Since difference in size for firms around the threshold would be small, it is difficult to precisely control their ranking relative to other firms in the dynamic trading market. Therefore, it is unlikely that firms could self-select on one side of the threshold. Even in the presence of manipulation, Lee (2008) formally shows that discontinuity design is still valid as long as firms do not have precise control over their assignment. I further test the manipulation using density test suggested in McCrary (2008). If the firms expect the benefit of lower cost of loans and self-select into the Russell 2000 index, we should observe that firms at the top of Russell 2000 index will borrow more loans. The result of density test is presented in figure 5. I do not find any significant difference in terms of borrowing frequency between firms at the bottom of Russell 1000 index and those at the top of Russell 2000 index.

5.3 Nonparametric form, bandwidth choice, and placebo tests

In this section, I test whether the results using linear function form are robust to different nonparametric form or bandwidth choice. Overall, results are qualitatively the same and suggest that IO only affects the loan spread but not the non-pricing contract terms. Results are shown in Table 6. Panel A presents the results using local polynomial specification and a third-degree polynomial with an Epanechnikov Kernel with a Rule of Thumb (ROT) bandwidth suggested in Fan and Gijbels (1996). We also test the results using 50% and 200% of the ROT bandwidth.

To demonstrate the significance of the threshold of 1000th rank in this RDD, in the falsification tests, the same estimation technique is applied to the 600th, 800th, 1200th, and 1400th ranks as thresholds. Results are reported in Panel B of Table 6. These results demonstrate that there is no significant effect at these random thresholds, which suggests that the main results in this paper are not picking up a random pattern in the sample.

6 Conclusion

Over the past two decades, the syndicated loan market has become the most important source of global corporate financing. Factors that influence the cost of bank loan are therefore of immense economic significance.

In this paper, I explore an exogenous discontinuity in institutional ownership and investigate the causal impact of institutional ownership on the bank loan pricing. I find that higher institutional ownership causes a decrease in loan spread but not in other non-pricing contract terms such as collateral, maturity, or covenants. Moreover, this impact is weaker for family firms. Further investigation reveals two potential channels of the casual impact. First, the benefit from monitoring effort by institutional investors is shared with debt holders. Second, the liquidity increase due to more institutional investors involvement leads to the improvement in the corporate governance because the "threat to monitor/exit" more reliable, and/or lower credit risk. Overall, this paper suggests that institutional ownership has a large causal impact on the cost of debt and the random inclusion in a stock market index could have a significant impact on the cost of bank loan financing.

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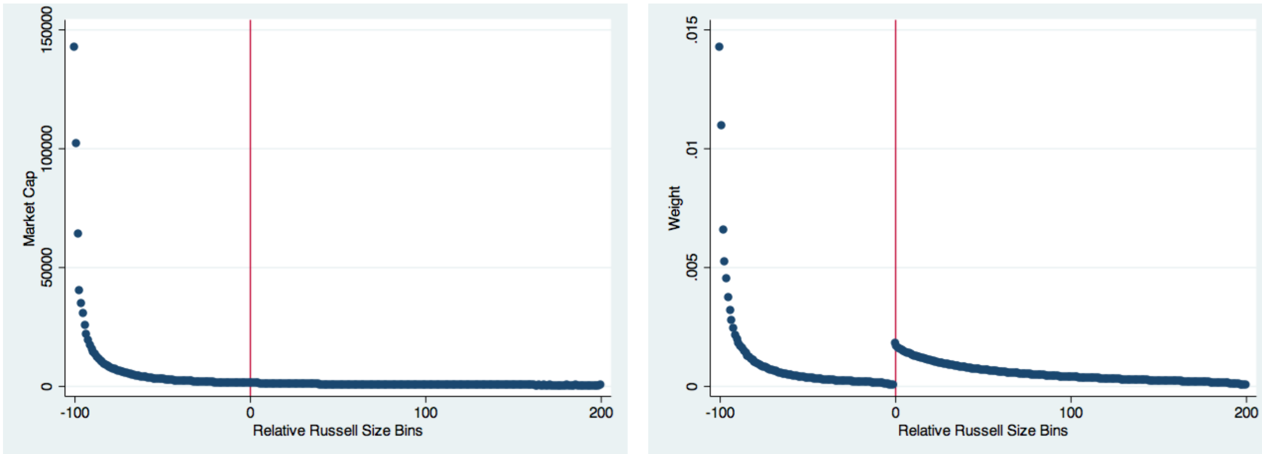
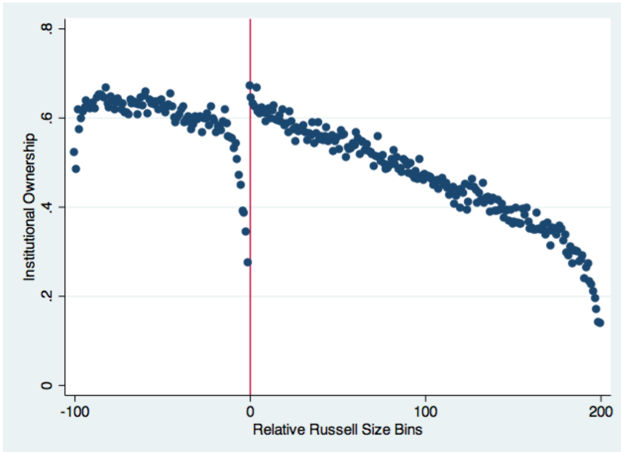


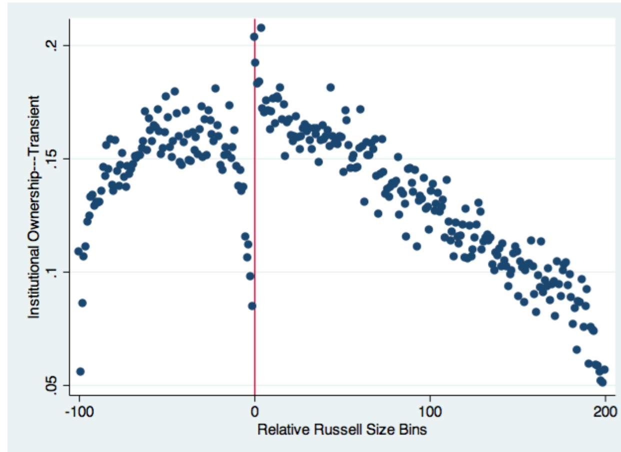
(a) Market Cap (b) Weight

Figure 1: Stocks around the Russell 1000 Inclusion Threshold

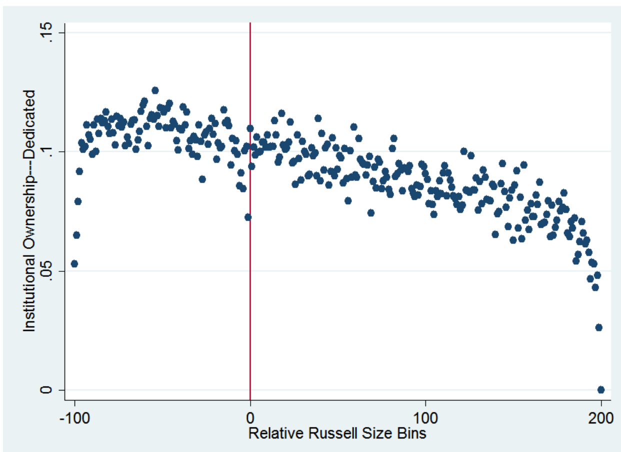
This figure shows the average stock market capitalization and index weights for the firms around the Russell 1000 inclusion threshold at the end of June. Firms are assigned to the Russell 1000 or 2000 based on the market capitalization of firms at the end of each May. Index weights are determined by using a float adjusted market capitalization within each index at the end of each June.



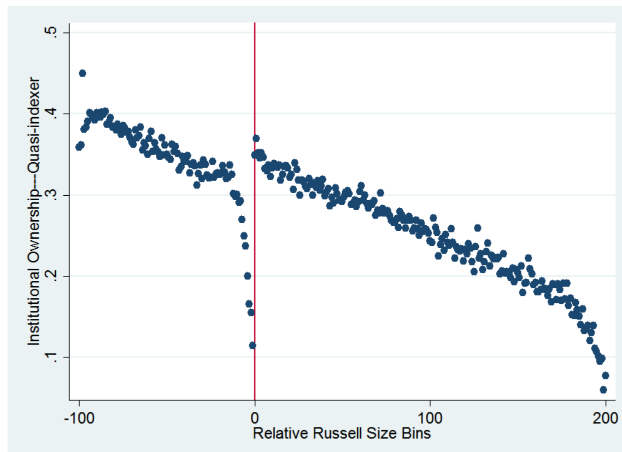
(a) Institutional Ownership



(b) Institutional Ownership—Transient



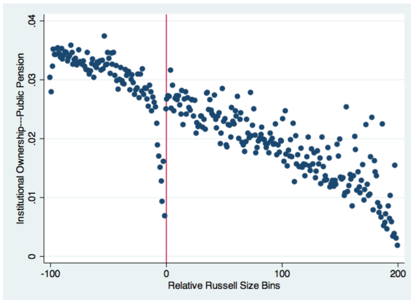
(c) Institutional Ownership—Dedicated



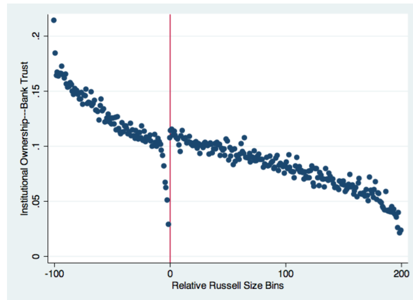
(d) Institutional Ownership—Quasi-indexer

Figure 2: Discontinuity Test for Institutional Ownership Around Russell 1000 Inclusion Threshold

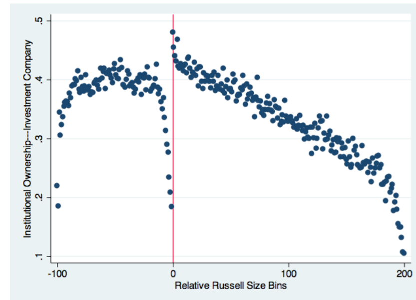
This figure plots the different types of institutional ownership based on the trading pattern(e.g. transient, dedicated, and quasi-indexer) against Russell size rankings at the end of June across all years. The X axis represents the relative distance from Russell 1000 inclusion threshold, with 0 represents the last firm in Russell 1000. Each dot represents the average IO over 10 ranks.



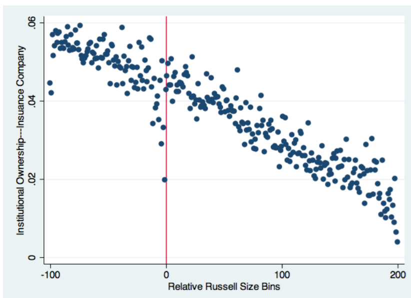
(a) Public Pension Fund



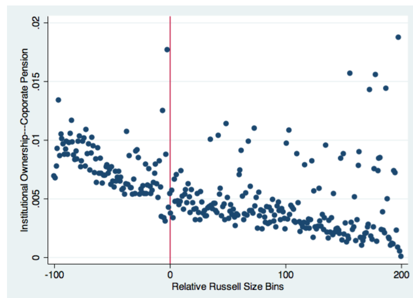
(b) Bank Trust



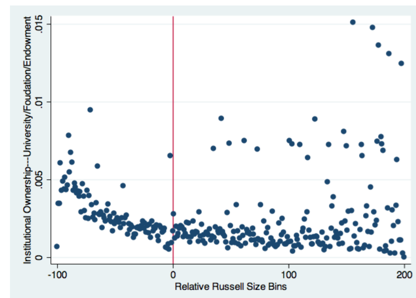
(c) Investment Company



(d) Insuance Company



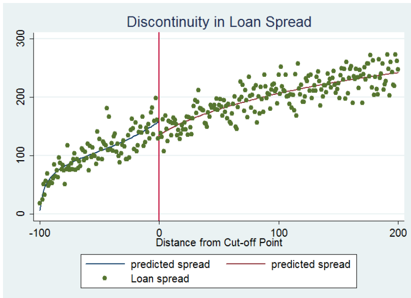
(e) Corporate Pension Fund



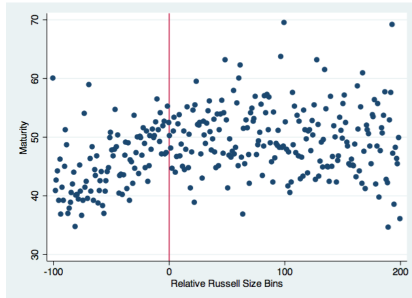
(f) University and Foundation Endowments

Figure 3: Discontinuity Test for Different Legal Type of Institutional Ownership

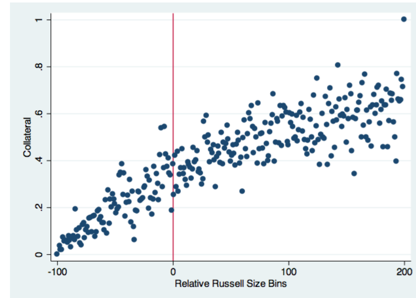
This figure plots the different legal types of institutional ownership (e.g. pension fund, investment company, ect.) against Russell size rankings at the end of June across all years. The X axis represents the relative distance from Russell 1000 inclusion threshold, with 0 represents the last firm in Russell 1000. Each dot represents the average IO over 10 ranks.



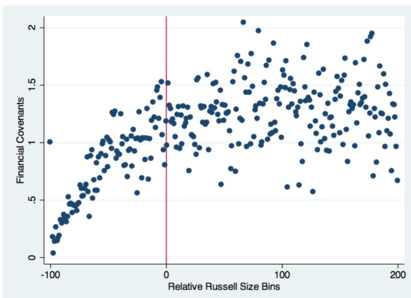
(a) Loan Spread



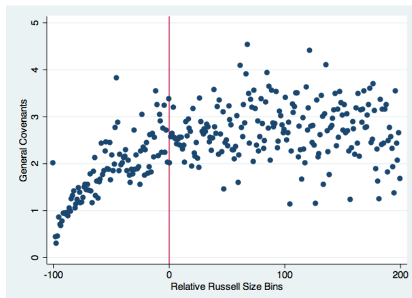
(b) Collateral



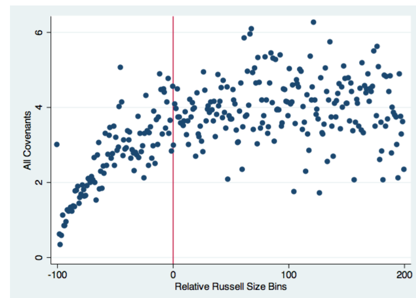
(c) Maturity



(d) Financial Covenants



(e) General Covenants



(f) Total Covenants

Figure 4: Discontinuity Test for Bank Loan Contract Terms

This figure plots the different contract terms of bank loans against Russell size rankings at the end of June across all years. The X axis represents the relative distance from Russell 1000 inclusion threshold, with 0 represents the last firm in Russell 1000. Each dot represents the average contract terms over 10 ranks.

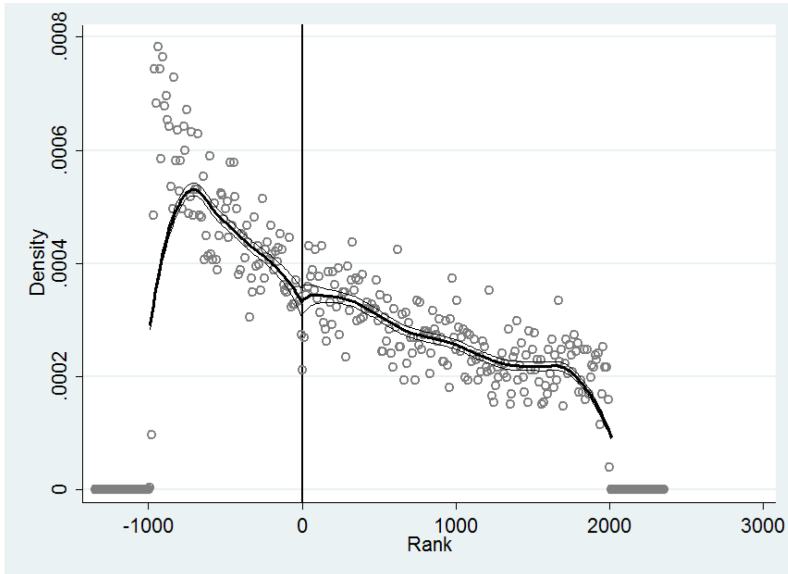


Figure 5: Density Test for Bank Loan Borrowing

This figure plots the frequency of bank loan borrowing against Russell size rankings at the end of June across all years. The X axis represents the relative distance from Russell 1000 inclusion threshold, with 0 represents the last firm in Russell 1000.

Table 1: Summary statistics for firms around 1000th rank

This table presents the summary statistics for the bottom 100 firms in Russell 1000 index (Panel A) and the top 100 firms in Russell 2000 index (Panel B). Market Cap is CRSP Price (PRC) multiplied by shares outstanding (SHROUT). Institutional Ownership is Thomson 13F Shares Held summed across all institutions scaled by CRSP shares outstanding (SHROUT). Expected Default Frequency is the Distance-to-Default measure using Merton model. Book to Market is book value of equity divided by Market value of equity (PRCC x CSHPRI). Leverage is Compustat Total Debt (DLC + DLTT) scaled by Total Asset. Tangibility is the Ratio of Property, Plant, and Equipment (PPE) to total assets. Profitability is the operating margin, calculated as ratio of EBITDA to sales. ROA is Net Income scaled by total assets.

Panel A: Russell 1000

	Mean	P25	Median	P75	Std.
Market Cap	1336.60	680.30	1154.40	1781.60	877.50
Institutional Ownership	0.45	0.22	0.42	0.65	0.27
Expected Default Frequency	0.04	0.00	0.00	0.00	0.13
Book to Market	0.74	0.21	0.41	0.85	0.88
Leverage	0.44	0.25	0.40	0.61	0.25
Tangibility	0.29	0.08	0.22	0.44	0.25
Profitability	0.14	0.07	0.14	0.22	0.14
ROA	0.05	0.01	0.05	0.10	0.11

Panel B: Russell 2000

	Mean	P25	Median	P75	Std.
Market Cap	1129.60	672.30	1163.40	1504.50	512.40
Institutional Ownership	0.63	0.46	0.66	0.82	0.26
Expected Default Frequency	0.02	0.00	0.00	0.00	0.08
Book to Market	0.80	0.29	0.59	1.17	0.69
Leverage	0.46	0.27	0.45	0.60	0.24
Tangibility	0.30	0.07	0.23	0.46	0.27
Profitability	0.12	0.06	0.13	0.19	0.14
ROA	0.03	0.01	0.04	0.08	0.11

Table 2: Discontinuity test for bank loan contract terms

This table presents the discontinuity test for bank loan contract terms and institutional ownership. IO is the institutional ownership of stocks. Spread is the all-inclusive cost of a drawn loan to the borrower. This equals the coupon spread over LIBOR on the drawn amount plus the annual fee and is reported in basis points. Maturity is the duration (in months) between facility activation date and maturity date. Collateral is a dummy variable that equals 1 if the loan was secured and 0 otherwise. Covenants is the total number of financial and general covenants in the loan facility. EDF is the expected default frequency which is a distance-to-default measure using Merton model. The test results are from estimating the following regression around the Russell 1000 exclusion/inclusion cutoff point:

$$Y = \alpha + \beta_1 * R2000 + \beta_2 * |Rank| + \beta_3 * |Rank| * R2000 + Year_i + \epsilon, \tag{3}$$

where for $|Rank| < 101$, R2000 is a dummy variable that equals 1 if the stocks are in Russell 2000 index, Rank is the relative rank against the 1000th rank which is Russell 1000 exclusion/inclusion cutoff point, and $Year_i$ are the year dummies. I use the OLS for spread and maturity regression, logit regression for collateral, and Poisson regression for covenant. Numbers in parentheses are standard errors (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	IO	Spread	Maturity	Collateral	Covenants	EDF
R2000	0.350***	-28.90***	-0.870	0.000	0.053	-0.049***
	(0.023)	(11.300)	(3.050)	(0.220)	(0.051)	(0.013)
Rank	0.003***	-0.260*	0.059*	0.007***	0.002***	-0.000**
	(0.001)	(0.130)	(0.036)	(0.003)	(0.001)	(0.000)
R2000*Rank	-0.003***	0.360*	-0.001	-0.002	-0.002**	0.001*
	(0.001)	(0.190)	(0.050)	(0.004)	(0.001)	(0.000)
N	1862	1559	1698	1865	1865	1587
Adj. R-sq	0.350	0.056	0.053			0.094
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Table 3: Regression results using switchers

This table presents the discontinuity test for bank loan contract terms. Spread is the all-inclusive cost of a drawn loan to the borrower. This equals the coupon spread over LIBOR on the drawn amount plus the annual fee and is reported in basis points. Maturity is the duration (in months) between facility activation date and maturity date. Collateral is a dummy variable that equals 1 if the loan was secured and 0 otherwise. Covenants is the total number of financial and general covenants in the loan facility. The test results are from estimating the following regression for the firms switching between Russell 1000 index and Russell 2000 index. Only the switching year and the year before switching are included in the sample:

$$Y = \alpha + \beta_1 * R2000 + Year_i + Firm_i + \epsilon, \tag{4}$$

where R2000 is a dummy variable that equals 1 if the stocks are in Russell 2000 index, $Firm_i$ are the firm dummies, and $Year_i$ are the year dummies. I use the OLS for spread and maturity regression, logit regression for collateral, and Poisson regression for covenant. Numbers in parentheses are standard errors (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	Spread	Maturity	Collateral	Covenants
R2000	-43.40*	-1.00	-0.14	0.20
	(25.70)	(5.78)	(0.45)	(0.16)
N	184	221	221	201
Adj. R-sq	0.39	0.40		
Pseudo R-sq				0.15
Year dummies	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes

Table 4: Cross section results

This table presents the cross-sectional results of the discontinuity tests. IO is the institutional ownership of stocks. Spread is the all-inclusive cost of a drawn loan to the borrower. This equals the coupon spread over LIBOR on the drawn amount plus the annual fee and is reported in basis points. Distress_high is a dummy that equals 1 if the EDF of firms is above the median. Family firm is a dummy variable that equals 1 if the firm has more than 5% family ownership. The test results are from estimating the following regression around the Russell 1000 exclusion/inclusion cutoff point:

$$Y = \alpha + \beta_1 * R2000 + \beta_2 * |Rank| + \beta_3 * |Rank| * R2000 + Year_i + \epsilon, \quad (5)$$

where for $|Rank| < 101$, R2000 is a dummy variable that equals 1 if the stocks are in Russell 2000 index, Rank is the relative rank from the 1000th rank which is Russell 1000 exclusion/inclusion cutoff point, and $Year_i$ are the year dummies. I use the OLS for spread regression. Numbers in parentheses are standard errors (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	Loan spread	Loan spread
R2000	-17.40	-107.30***
	(15.50)	(31.50)
R2000 X Distress_High	-12.20	
	(22.90)	
R2000 X Family firm		134.10**
		(58.10)
Family firm X Rank		0.06
		(0.53)
Rank	-0.18	-0.63
	(0.19)	(0.40)
R2000 X Rank	0.08	1.26**
	(0.26)	(0.49)
Distress_High X Rank	-0.02	
	(0.26)	
R2000 X Distress_High X Rank	0.24	
	(0.38)	
R2000 X Family firm X Rank		-1.47
		(0.93)
N	1554	430
Adj. R-sq	0.08	0.12
Test R2000+R2000 X Distress_high=0 (F-value)	3.10*	
Test R2000+R2000 X Family firm=0 (F-value)		0.32

Table 5: Potential channels

This table presents the results for testing the potential channels through which institutional ownership affects bank loan pricing. Illiquidity is the one-year-forward monthly average of the log(Amihud illquidity measure). Proxy voting rate is the proxy voting participation rate from ISS Risk Metrics Shareholder Proposal and Vote Results database. The test results are from estimating the following regression around the Russell 1000 exclusion/inclusion cutoff point:

$$Y = \alpha + \beta_1 * R2000 + \beta_2 * |Rank| + \beta_3 * |Rank| * R2000 + Year_i + \epsilon, \quad (6)$$

where for $|Rank| < 101$, R2000 is a dummy variable that equals 1 if the stocks are in Russell 2000 index, Rank is the relative rank from the 1000th rank which is Russell 1000 exclusion/inclusion cutoff point, and $Year_i$ are the year dummies. Numbers in parentheses are standard errors (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	Illiquidity	Proxy voting rate
R2000	-0.800***	0.450***
	(0.092)	(0.033)
Rank	-0.0088***	0.008
	(0.001)	(0.001)
R2000 X Rank	0.012***	-0.006***
	(0.002)	(0.001)
N	1220	1220
Adj. R-sq	0.690	0.450

Table 6: Robustness check

This table presents the robustness test for bank loan contract terms. Spread is the all-inclusive cost of a drawn loan to the borrower. This equals the coupon spread over LIBOR on the drawn amount plus the annual fee and is reported in basis points. Maturity is the duration (in months) between facility activation date and maturity date. Collateral is a dummy variable that equals 1 if the loan was secured and 0 otherwise. Covenants is the total number of financial and general covenants in the loan facility. Panel A reports the tests using nonparametric form and different bandwidth choices. The test results are from fitting a third degree polynomial estimate to the left and to the right of the Russell 1000/2000 threshold. The Rule of Thumb (ROT) bandwidth is suggested in Fan and Gijbels (1996). Panel B reports the placebo tests using 600th, 800th, 1200th, and 1400th ranks as the cutoff points. Numbers in parentheses are standard errors (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

Panel A: Nonparametric form and different bandwidth

	ROT Bandwidth(83)	50% Bandwidth	200% Bandwidth
Spread	-20.10**	-12.65**	-23.86*
Collateral	0.10	0.09	0.02
Maturity	2.08	8.49	1.87
Covenant	0.21	0.02	0.86

Panel B: Placebo tests using different rank as cutoff point

	600th Rank	800th Rank	1200th Rank	1400th Rank
R2000	-11.90	-11.50	3.10	22.50
	(9.39)	(8.78)	(9.82)	(21.60)
Rank	-0.22**	-0.31***	0.13	0.46***
	(0.11)	(0.11)	(0.12)	(0.13)
R2000 X Rank	0.08	0.42***	0.20	-0.31
	(0.16)	(0.15)	(0.17)	(0.20)
N	1981	1763	1478	1501
Adj. R-sq	0.07	0.11	0.07	0.09