Corporate Bond Pricing and Ownership Heterogeneity*

Kershen Huang† — *Bentley University*

Alex Petkevich‡ — *University of Toledo*

January 30, 2015

Abstract

We examine how heterogeneity in institutional equity ownership affects bondholders. Our results show that firms with larger short-term (long-term) institutional ownership are associated with higher (lower) future bond yield spreads. The effect of short (long) horizons is mainly driven by more concentrated (diffused) institutional holdings. In addition, the adverse effect of short-term ownership on bond yield spreads occur in borrowing firms with higher financial distress risk, stronger management rights, and higher stock volatility. The lower cost of corporate debt associated with long-term ownership, on the other hand, appears to be more systematic.

JEL Classification: G12, G32, G34

Keywords: Agency cost of debt, information, institutional investors, investment horizon

*We thank Colin Campbell, Doina Chichernea, Len Rosenthal, and seminar participants at Bentley University and University of Toledo for insightful comments and suggestions. Any remaining errors or omissions are the authors' alone.

†McCallum School of Business, Bentley University, Waltham, MA 02452. E-Mail: khuang@bentley.edu

‡Neff Department of Finance, College of Business and Innovation, University of Toledo, Toledo, OH 43606. E-Mail: alexey.petkevich@utoledo.edu

1 Introduction

The debt and equity investors of a firm are claimants to the same aggregate value. Creditors are protected by the absolute priority rule, but unlike shareholders, they do not fully enjoy the upside potential of the firm. This difference in payoff structures between the two parties leads to discrepancies in their attitudes toward risk. Therefore, considering the characteristics of shareholders while pricing the investments of creditors is essential, especially when the shareholders have large-enough holdings that incentivize them to produce information (Grossman and Hart, 1980; Shleifer and Vishny, 1986).[1] With this motivation, we examine how heterogeneity in institutional equity investors' horizons affects corporate debt pricing.

Our results show that firms with larger short-term (long-term) institutional ownership are associated with higher (lower) future bond yield spreads. The effect of short (long) horizons is mainly driven by more concentrated (diffused) institutional holdings. In addition, the adverse effect of short-term ownership on bond yield spreads appears in borrowing firms with higher financial distress risk, stronger management rights (stronger antitakeover provisions), and higher stock volatility. The lower cost of corporate debt associated with long-term ownership, on the other hand, appears to be more systematic.

With the growth of institutional equity holdings since the 1980s, Bhojraj and Sengupta (2003) first suggest that institutional investors, as a governance mechanism, are beneficial to bondholders. Viewing their results together with other existing studies on bondholder wealth opens up further interesting questions which we shed light on in this study.

First, empirical evidence regarding the effect of governance mechanisms on creditor wealth is mixed. Effective monitoring by institutions may hinder agency problems such as shirking (Jensen and Meckling, 1976), empire-building (Jensen, 1986), and inefficient compensation

[1] This is foundation behind Merton (1974). It is worth mentioning that the importance of equity investors is not only relevant for debt pricing under high default risk of borrowing firms. Garlappi and Yan (2011), for instance, show that shareholder bargaining power can lead to deviations from the absolute priority rule.

(Murphy, 1985). It may also mitigate information risk through requirements on the accuracy and timeliness of disclosures (Sengupta, 1998; Healy et al., 1999). While the presence of institutional ownership is found to be beneficial to all stakeholders in many studies, there is also evidence suggesting otherwise. Myers (1977) suggests that aligning management with shareholders gives rise to shareholder-creditor conflicts such as asset substitution and debt overhang problems. Other studies, including Klock et al. (2005) and John and Litov (2009), find that there is indeed a tradeoff between the two types of agency problems in regards to corporate bonds. Our base results show support for the *agency conflict hypothesis* (*governance hypothesis*), which states that governance is detrimental (beneficial) to bond pricing, under circumstances where short-term (long-term) institutional ownership is larger. Further, the adverse effect of SIO on spreads is mainly driven by firms with higher financial distress risk. As agency costs of leverage exist when investments have different consequences for the values of debt and equity, the conflict between creditors and shareholders is exacerbated when there is a higher risk of financial distress.

Second, the literature on blockholding involves two competing hypotheses regarding the effect of ownership concentration on firm governance (Barclay and Holderness, 1992). An institution can provide more powerful influence if its shareholding is more concentrated. The *shared benefits hypothesis* states that a higher concentration in institutional shareholding spills over the benefits of effective governance to creditors (e.g., through a lower probability of default), making all stakeholders better off. In contrast, the *private benefits hypothesis* states that a more concentrated ownership provides an institution with stronger incentives to secure certain benefits for itself (Morck et al., 1988). This may involve over-monitoring and undue influence on management that can harm bondholders and other shareholders (Barclay et al., 1993). We find overall support for the latter by showing that the higher (lower) bond yield spreads associated with short-term (long-term) institutions are attributed to situations where their shareholding concentration is high (low).

Third, it is interesting to see how different types of institutions interact with external governance mechanisms (i.e., shareholder rights; Gompers et al. 2003; Bebchuk et al. 2009) in determining bond prices. Prior evidence suggests that public debt is more costly when shareholder rights are strong (Klock et al., 2005; Francis et al., 2010). Cremers et al. (2007) find that institutional shareholding is associated with higher (lower) bond yields if external governance is strong (weak). We take it one step further and find that our base results, where larger short-term (long-term) ownership leads to higher (lower) future bond yield spreads, are more pronounced when shareholder rights are weak. The positive association between short-term ownership and bond yield spreads is no longer statistically significant at conventional levels when shareholder rights are strong. We interpret this to mean that when external governance from the market of corporate control is weak, it is more likely that short-term investors exacerbate agency conflicts of leverage and that there is more room for long-term investors to make improvements. This also suggests that when the possibility of takeover as a monitoring mechanism is not as effective, creditors rely more on their observation of *existing* institutional ownership in the pricing of debt (i.e., a substitution effect).

Fourth, several studies emphasize the importance of institutional trading on stock characteristics. Campbell and Taksler (2003) identify idiosyncratic volatility of stocks as a driving force for larger bondholder risk. Cremers and Pareek (2014) find that an increase in transient investors is associated with higher idiosyncratic volatility and momentum profits, while Chichernea et al. (2014) show that short-term (long-term) investors are associated with higher (lower) idiosyncratic risk. Consistent with prior literature, we provide evidence that the equity volatility channel is relevant for short-term institutions in bond pricing. However, the estimated coefficient of long-term ownership, while negatively significant in all cases, does not vary significantly or economically in equity volatility.

In sum, we argue that different types of institutions affect bond pricing differently, and that the dynamics that they play may be through different channels. In our analysis, we follow Gaspar et al. (2005) and Yan and Zhang (2009) in differentiating institutions into short-term (SIO) and long-term (LIO) investors. Investment horizons are determined using churn rates calculated from institutional holdings in the Thomson-Reuters (TFN) 13F database. The pricing of bonds is captured using bond yield spreads. From bond transactions and price quotes data in Bloomberg and TRACE, we calculate a dynamically adjusted spread for a bond by taking the difference between its inferred bond yield and the yield on the Treasury security of the closest maturity compared to the remaining life of that bond. By using spreads, we focus on examining the risk structure of bonds (i.e., default risk and liquidity, rather than term structure). An institution's investment horizon signals its preferences for monitoring, information, and trading behavior. Through incentivizing management choices, these institutional preferences impact bondholders' perception of the risk associated with the promised cash flows on their investments, leading them to price accordingly.

Short-term institutions are more likely passive in monitoring and pursue exit strategies, whereas long-term institutions are more likely active and engage in relationship investing.[2] When management is pressured by institutions to aim for short-term profitability, these goals often come at the cost of long-term returns (Bushee, 1998; Dechow and Sloan, 1991). A firm may, for instance, cut R&D expenses in order to boost earnings or reverse an earnings decline. Under such scenarios, an institution's monitoring incentive lies in myopic gains and not the actual well-being of the firm, let alone the firm's ability to raise capital in future rounds of financing. When the firm is not performing as well as expected, the institution simply sells off its shares, instead of making improvements. In contrast, when an institution actively works with the management to achieve long-term prospects, the well-being of the firm is more relevant for the institution. In such cases, the firm's ability to acquire external funds directly impacts whether positive NPV projects can be funded, and its costs of capital also

[2] See Holmström and Tirole (1993) and Tirole (1996) for the formal definitions of active and passive monitoring.

determine the NPVs of those projects. Recent studies have also shown that institutional ownership with long-term focus are associated with larger optimal cash holdings and less mispricing of corporate policies, suggesting that active monitoring lowers agency costs of free cash flow and uncertainty in earnings (Derrien et al., 2014; Harford et al., 2012). Our findings are consistent with these arguments.

We ensure the robustness of our results by endogenizing institutional ownership, examining additional measures of creditor risk (e.g., credit ratings, CDS spreads), employing different categorization of investor horizon and type, and using alternative model specifications (Fama and MacBeth, 1973). Our results remain qualitatively unchanged in all cases.

While prior research is rich in understanding how stock market participants learn from different types of creditors (e.g., Billett et al., 1995), the opposite receives relatively little attention. Beginning in the 1980s, the development of institutional ownership has created an inherent information production mechanism in the stock market (Grossman and Hart, 1980; Shleifer and Vishny, 1986). As the growth and evolvement of institutional ownership orient management decisions more toward shareholder interests, institutions' effect on corporate debt pricing becomes increasingly important.[3] In the U.S., public debt financing makes up 32% of external funds for nonfinancial businesses, compared to the 11% from new stock issuances (Hackethal and Schmidt, 2004).[4] Thus, an effect of institutional ownership on bond spreads can have economically significant consequences on not only the market value of existing liabilities and the cost of future financing for a firm, but also the capital allocation among market participants.

Aside from marketable debt financing being an important source of external funds for firms, we study bonds because they provide us with a cleaner setting in examining the impact

[3]See Gillan and Starks (2000) and Monks and Minow (2011) for recent developments on institutional ownership.

[4]These numbers are based on the flows of external funds to firms. Taking into consideration that debt securities mature, the ability to raise funds through corporate debt is even more important than what the numbers indicate.

of institutional equity investors on creditor wealth. Since 1970, more than 95% of new bond and commercial paper issuances are sold to financial institutions such as insurance companies, mutual funds, and pension funds. By examining bondholders and institutional equity investors, we narrow our analyses to parties that are of similar demographics (institutions) and operate under similar informational environments (securities markets), while playing different roles as claimants to firm value (debt and equity, respectively).[5]

We contribute to the understanding of institutional investors' association with firm value (McConnell and Servaes, 1990), policies (Jarrell and Poulsen, 1987), and stakeholder wealth in general (Agrawal and Mandelker, 1990; Bhojraj and Sengupta, 2003). We also add to the growing line of research that examines investor heterogeneity and its association with various aspects of firms and highlight the importance of shareholder heterogeneity in the examination of agency costs in corporate bond pricing.

For the remainder of this paper, we describe our data and sample in Section 2, perform our main empirical analyses in Section 3, present robustness checks of our findings in Section 4, and conclude in Section 5.

2 Data

2.1 Data Sources and Sample

We obtain bond issue level information from Bloomberg and TRACE (Trade Reporting and Compliance Engine). These data contain over-the-counter market activity information on secondary market transactions and quotes on publicly traded debt securities. We collect data on all corporate bond issues that are available from January 1995 to December 2012.

[5]In addition to the 32% in corporate bonds and 11% in stocks, nonfinancial businesses in the U.S. rely heavily on bank loans (18%) and non-bank private debt placements (38%) when raising external capital. These understate the importance of indirect financing, however, since more than 95% of new marketable debt and more than 65% of new shares are purchased by institutions.

We retain only nonconvertible, fixed-coupon bonds that are dominated in U.S. Dollars and issued by U.S. firms. We require that observations have non-negative prices and maturity dates that are later than the quote/transaction dates.

Ownership data are from the Thomson Reuters (TFN) Institutional Holdings File (13F; formerly CDA/Spectrum). The 13F contains information on institutional common stock holdings and transactions reported to the Securities and Exchange Commission (SEC). As such, the database contains all institutional managers with $100 million or more in assets under management. For firms in the CRSP-Compustat intersection (CCM) that are not covered by the 13F, it is likely that their equity holdings simply do not meet the SEC filing requirements (Grinstein and Michaely, 2005). We therefore set their institutional holdings to 0%.

Financial statement items are obtained from the Compustat quarterly fundamentals file and are as of the fiscal-quarter-end date prior to a given TFN reporting date. Capitalization, equity returns, shares outstanding, and trade volume data are from the CRSP (Center for Research in Security Prices) monthly stocks file. We exclude financial (SIC codes from 6000 to 6999) and utility (SIC codes from 4900 to 4999) firms from our study.

Our final sample consists of 79,997 bond-quarter observations. It includes 5,424 issues of bonds by 1,040 unique firms. We winsorize our variables at the 1st and 99th percentiles to avoid the potential effect of outliers. To address inflationary concerns, we adjust all monetary variables to December 2010 Dollars using price index data from the U.S. Bureau of Labor Statistics (BLS). Stock returns are also adjusted by inflation.

2.2 Key Variables

In this section, we explain the constructions of our key variables. We discuss all other covariates as we introduce our empirical models. The definitions of all variables used in this study can also be found in the Appendix. Text that appears in `typewriter` fonts represent

Compustat item names.

2.2.1 Bond Pricing

Our primary dependent variable for bond pricing is corporate bond yield spreads (SPRD). For each bond-quarter observation, we infer the annualized yield (YLD) on the bond using its price for that quarter and the promised cash flows for its remaining life. To adequately capture the risk structure of yields, we match each bond to the Treasury security from the same quarter that has a term to maturity closest to the remaining life of the bond. Over the life of each bond issue, we calculate its yield spread dynamically for each quarter by taking the difference between the inferred bond yield and the yield on the matched Treasury security. Specifically, the yield spread for corporate bond issue i at time t is

$$\text{SPRD}_{i,t} = \text{YLD}_{i,t} - r_t^{f,T-t}, \tag{1}$$

where T denotes the maturity date of the corporate bond. $r_t^{f,T-t}$ is the Treasury yield at time t with a term to maturity closest to $T-t$, i.e., the remaining life of the corporate bond.

We also employ credit ratings as an alternative measure for credit risk in the robustness checks section of this paper. Credit rating data are from Compustat and Bloomberg. Following Avramov et al. (2007), we convert letter ratings (AAA/Aaa, AA+/Aa1, . . . , D/C) directly to numeric values (1, 2, . . . , 22).

2.2.2 Investment Horizons

Our main explanatory variables are equity ownerships of firms by short-term (SIO) and long-term (LIO) institutional investors. We measure investment horizons of institutional investors for each calendar quarter based on their average quarterly portfolio turnover over the past year using investor churn rates (Gaspar et al., 2005; Yan and Zhang, 2009). The churn rate of investor k for quarter t is defined as

$$\mathrm{CR}_{k,t} \equiv \frac{\min\left(\mathrm{Churn}_{k,t}^{\mathrm{buy}}, \mathrm{Churn}_{k,t}^{\mathrm{sell}}\right)}{\frac{1}{2}\sum_{j\in J}\left(N_{j,k,t}P_{j,t} + N_{j,k,t-1}P_{j,t-1}\right)}, \tag{2}$$

where

$$\mathrm{Churn}_{k,t}^{\mathrm{buy}} = \sum_{j\in J; N_{j,k,t}>N_{j,k,t-1}} \left|N_{j,k,t}P_{j,t} - N_{j,k,t-1}P_{j,t-1} - N_{j,k,t-1}\Delta P_{j,t}\right| \tag{3}$$

and

$$\mathrm{Churn}_{k,t}^{\mathrm{sell}} = \sum_{j\in J; N_{j,k,t}\leq N_{j,k,t-1}} \left|N_{j,k,t}P_{j,t} - N_{j,k,t-1}P_{j,t-1} - N_{j,k,t-1}\Delta P_{j,t}\right| \tag{4}$$

measure aggregate purchase and sale, respectively. $N_{j,k,t} \geq 0$ is investor k's shareholding of firm $j \in J$ for quarter t, where J is the set of all firms in our sample. $P_{j,t}$ denotes the price per share of firm j at the end of quarter t. The quarterly churn rate $\mathrm{CR}_{k,t}$ for investor k at time t, defined as the minimum of purchase- and sale-generated changes in number of shares, valued using end-of-quarter prices at time t and scaled by average portfolio size during the past quarter from $t-1$ to t, captures the portfolio turnover of an institutional investor during that past quarter.

The investment horizon for investor k at quarter t is determined using k's average churn rate over the past four quarters, i.e.,

$$\mathrm{avgCR}_{k,t} = \frac{1}{4}\sum_{t'=0}^{3} \mathrm{CR}_{k,t-t'}. \tag{5}$$

Intuitively, a higher average churn rate implies a shorter investment horizon. For each quarter, we classify an institution as short-term (long-term) if it has an average churn rate that is above (below) the sample median for that quarter.

A firm j would have a portion of its equity being held by institutional investors during each quarter. This portion, which ranges from 0% and 100%, is referred to as total institutional ownership (TIO). Using the categorization of investment horizons earlier, we decompose firm level TIO into SIO and LIO. Therefore,

$$\mathrm{TIO}_{j,t} = \mathrm{SIO}_{j,t} + \mathrm{LIO}_{j,t} \tag{6}$$

for firm j at time t.

3 Analyses

3.1 Descriptive Statistics

Table I presents descriptive statistics for our sample. The mean of corporate bond yield spreads (SPRD) is 2.43%, with a standard deviation of 2.37%. On average, credit ratings are 8.02, approximately corresponding to BBB+/Baa1. On the scale from 1 to 22, the distribution of credit ratings in our sample is skewed toward smaller values, indicating that bonds in our sample are issued by firms of higher ratings. This is consistent with the empirical evidence that trustworthy firms are able to issue more bonds. The bond issues have an average market size of $465.49 thousands and a standard deviation of $504.19 thousands.

[Insert Table I about here.]

At the bond level, the mean (median) short-term and long-term institutional ownership are 26% (24%) and 45% (46%) for firms across our sample period, respectively. These make up 71% mean total institutional ownership. Comparing this to Bhojraj and Sengupta's (2003) 55.23% during their sample period from 1991 to 1996, institutions are gradually holding more shares of firms.

From earlier arguments, we expect that different institutions associate with corporate bond pricing differently. We begin by examining bond yield spreads of portfolios sorted on

SIO and LIO quintiles. We do so for each quarter of our sample period and report the results in Figure 1.

[Insert Figure 1 about here.]

Preliminarily, we find that bond portfolios where issuing firms are associated with lower SIO have lower bond yield spreads (left of the left panel). As the proportion of shares outstanding held by SIO increases, yield spreads increase as well (moving from left to right of the left panel). From the figure, average credit spreads increase from 2.8% (lowest SIO quintile) to 3.9% (highest SIO quintile). In contrast, the relation between LIO and yield spreads shows opposite patterns. That is, bond portfolios where issuing firms are associated with lower LIO have higher bond yield spreads (left of the right panel). The spreads decrease as LIO increases (moving from left to right of the right panel).

3.2 Investment Horizons and Corporate Bond Yield Spreads

In this section, we continue to examine the relation between corporate bond pricing and institutional investment horizons under a multivariate setting. Our baseline models take the following form in estimating lead yield spreads:

$$\text{SPRD}_{t+1} = \beta_0 + \beta_{\text{S}}\text{SIO}_t + \beta_{\text{L}}\text{LIO}_t + \mathbf{X}_t B' + \epsilon_t, \tag{7}$$

where β and B are the estimated coefficients and ϵ is the vector of errors. $\mathbf{X}$ is the matrix of control variables that include bond level characteristics (term left to maturity, current bond price, bond return over the past quarter, and issue size), firm level characteristics (tangibility, z-score, debt-to-equity ratio, profitability, firm size, market-to-book ratio, stock beta, and stock return over the past quarter), and macroeconomic controls (credit spread and term spread). Variable definitions can be found in the Appendix. All models are estimated using Petersen's (2009) two-way clustering methodology that simultaneously controls for cross-sectional and time-series dependencies.[6]

[Insert Table II about here.]

In Table II, we show the correlation matrix of our dependent, key explanatory, and control variables. The correlation coefficient between corporate yield spreads and SIO (LIO) is significantly positive at 0.09 (significantly negative at -0.13). These numbers are consistent with the patterns shown in Figure 1 and with what we expect from our arguments. If the short-term institutions (long-term institutions) in our sample support the agency conflict hypothesis (governance hypothesis), then we should continue to see a significantly positive (negative) estimated coefficient for their ownership under the multivariate setting. We report results from our baseline regression models in Panel A of Table III.

[Insert Table III about here.]

In Model 1, the key explanatory variable is total institutional ownership (TIO). Consistent with Bhojraj and Sengupta's (2003), we document that institutional ownership lowers corporate yield spreads on average. The estimated coefficient on TIO is -0.48 and has a t-statistic of -1.83. Therefore, institutional ownership as a whole appears to be beneficial for bondholders.

In Models 2 and 3, we add into the bond pricing estimation SIO and LIO as additional explanatory variables, respectively. These show the incremental effects of SIO and LIO on bond pricing, conditioning on the two having equal effects within the aggregated TIO. That is, the total SIO effect in Model 2 is the sum of the estimated coefficients for TIO and SIO,

[6] There is debate as to whether duration or maturity should be used as a control variable in estimating yields. Both capture the remaining life of debt securities, while the former more effectively does so. However, the calculation of duration accounts for time value of money and requires yield, which is (partially) our dependant variable. For this reason, we use maturity. This is consistent with prior studies on debt pricing such as Bhojraj and Sengupta (2003) and Graham et al. (2008), among many others. Using duration instead does not change our results qualitatively (results available upon request).

and the total LIO effect in Model 3 is the sum of the estimated coefficients for TIO and LIO. We see that short-term (long-term) institutions significantly increase (decrease) corporate bond yield spreads, and that both play dominating roles over aggregate ownership as bond pricing determinants. The estimated coefficient for SIO (LIO) is 2.3808 (−2.3260), with a t-statistic of 6.02 (−5.87), compared to the −1.7190 (0.6825) estimated for TIO that is significantly smaller in magnitude.

In Model 4, we use SIO and LIO together in place of TIO. We continue to see that bonds issued by firms of larger SIO (LIO) are associated with higher (lower) lead bond yield spreads. Notably, while both statistically significant, the magnitude of LIO more than doubles that of SIO, contributing to the overall lower bond yields found in prior studies. The estimated coefficients for SIO and LIO are 0.7303 and −1.6609, respectively. To put this into perspective, a 100% increase in SIO (LIO) is associated with an increase (decrease) of 73 (166) basis points in corporate bond yield spreads. Additionally, a one-standard-deviation increase in SIO (LIO) leads to a one-quarter-ahead corporate yield spread increase (decrease) of 7.3 (16.6) basis points.

Taken together, our results suggest that corporate bond spreads decrease in institutional equity investment horizons. LIO is the main driver behind the negative relation between institutional ownership and bond yields found in prior studies. These findings are consistent with our earlier arguments that short-term institutions are more likely passive in monitoring and pursue exit strategies, whereas long-term institutions are more likely active and engage in relationship investing. As the former can pressure managers to achieve near-term goals even at the cost of long-term returns and the wealth of other stakeholders, the latter more likely work with them for long-term prospects and the well-being of the entire firm.

3.2.1 Evidence for Long-Term Effects

Although agency problems that arise from leverage (e.g., excessive risk taking and debt overhang) appear to be cases where equity holders benefit at the expense of existing debt holders, it is the equity holders who bear these costs in the long-term. As a firm issues new bonds, creditors determine their willingness to pay for the bonds given the ownership structure of the firm. Thus, characteristics of institutional ownership can alter managerial incentives, and in turn signal about future firm financing and investment activities. Figure 2 depicts this relation using the foundation behind Merton's (1974) corporate debt pricing model. Without borrowing, the payoff for an unlevered owner (blue) equals to firm value. If the firm borrows, then firm value is split between the creditor (green) and the levered owner (red). The creditor's payoff structure is essentially a put option written on firm assets and is affected by the connection between the levered owner and the manager (black and dashed). When this connection is strong, meaning that when the shareholder can more easily incentivize the manager, the type of the shareholder plays a more important role in the pricing of debt.[7]

[Insert Figure 2 about here.]

Another reason to why we can expect our base findings is that, agency conflicts due to leverage reflect not only in the higher spreads that the firm has to pay, but also in the availability of distributable earnings to shareholders and the need for additional financing due to lower bond issuance prices. The lower bond prices at issuance affect both the availability of earnings distribution to shareholders and the need for additional financing that is subject to more adverse selection problems and issuance costs. As long as markets are not strongly efficient, however, these problems may not be as detrimental to SIO as they are for LIO (i.e.,

[7]Note that the involvement of managerial decisions by institutional shareholders can be direct (actively manage) and/or indirect (passively observe and trading a large number of shares).

exiting strategies can limit losses, making these conflicts less costly for SIO).[8] For LIO, in contrast, it is only rational for them to engage in costly improvements if there are long-term consequences in the benefits from current shareholding. We provide some evidence for this.

In Panel B of Table III, we replace one-quarter-ahead corporate yield spreads with those from two quarters (Model 1), one year (Model 2), two years (Model 3), and three years (Model 4) ahead. All previous control variables are included, but are omitted from reporting due to space concerns. In all estimations, we find that SIO (LIO) remains significantly positive (negative) in explaining lead yield spreads.

3.3 Institutional Ownership Concentration

Our results thus far show that LIO is beneficial for the bond pricing of firms. From our baseline models, we show that bonds issued by firms with larger long-term institutional ownership enjoy lower corporate bond yield spreads. This leaves one to wonder: If a long-term institution has more controlling power over a firm through higher concentration in its shareholding, does this concentration amplify the benefits? It is reasonable to think that an institution would be able to provide more effective monitoring if its shareholding is more concentrated. However, more concentrated ownership provides an institution with stronger incentives and power to secure certain benefits for itself even at the expense of other stakeholders (e.g., over-monitoring and undue influence on management; see Barclay et al., 1993).

If our sample supports the shared benefits hypothesis, then we would observe in our bond pricing model negative LIO coefficients that are larger in magnitude for more concentrated holdings. That is, a more concentrated LIO makes bondholders better off. If our sample instead supports the private benefits hypothesis, then we would observe the opposite. We are

[8] If markets were strongly efficient, all costs should be priced correctly, leaving no room for SIO to dodge the losses from exit strategies.

also interested in seeing how the SIO coefficients can differ given variations in institutional ownership concentration. In addition to testing the private benefits analysis, if SIO is indeed more likely associated with agency problems, we would expect to see its effect to be larger in magnitude when there is higher concentration.

We examine ownership concentration from the investor level by decomposing both SIO and LIO into a more concentrated component (ownership of institutions that hold more than or equal to some threshold $x\%$ of shares outstanding of the firm) and a less concentrated component (ownership of institutions that hold less than $x\%$ of shares outstanding of the firm). We report these results in Table IV. Models 1, 2, and 3 uses threshold $x = 1\%$, 3%, and 5%, respectively.

[Insert Table IV about here.]

We observe several things. First, the negative effect of LIO on corporate bond spreads is limited to less concentrated ownerships. The estimated coefficient for LIO when $x = 1\%$ in Model 1, for instance, is negatively significant at -10.3115 (t-statistic $= -10.30$) for the less concentrated component and positively insignificant at 0.0377 (t-statistic $= 0.11$) for the more concentrated component. This pattern remains throughout all models. Second, the negatively significant (positively insignificant) coefficient for the less (more) concentrated LIO decreases (increases) in magnitude as we raise the threshold x, but remains statistically significant (insignificant) up to at least 5%. The estimated coefficients for the less concentrated LIO, for example, are -10.3115, -6.3322, and -4.0027 when we set x equal to 1%, 3%, and 5%, respectively. For the more concentrated LIO, these numbers are 0.0377, 0.1926, and 0.4838. Third, the effect of SIO on spreads is driven by and increasing in more concentrated short-term ownership. The estimated coefficients for concentrated SIO are 1.4326, 1.8097, and 1.9248 (3.93) when we set x equal to 1%, 3%, and 5%, respectively.

Together, the more concentrated the LIO, the smaller the impact of LIO in lowering one-quarter-ahead corporate bond yield spreads; the more concentrated the SIO, the larger the impact of SIO in increasing one-quarter-ahead corporate bond yield spreads. In both cases, institutional ownership concentration does not appear to benefit bond pricing, regardless of the variation in their investment horizons. We thus provide support to the private benefits hypothesis of blockholding. Although LIO appears to be beneficial for bondholders, this benefit decreases in concentration. These results also lend further support to our earlier arguments that SIO is more likely associated with larger agency costs of leverage.

3.4 Financial Distress Risk

We attribute the opposite effects of SIO and LIO on lead corporate yield spreads to their associations with managerial incentives. During their rational pursuits of self-interest, institutions with relatively long investment horizons are more likely to be beneficial to the firm as a whole, and those with relatively short horizons are more likely to exacerbate agency conflicts between shareholders and bondholders. An important characteristic of leverage-related agency problems is that they are more severe in situations where financial distress risk is higher. If SIO indeed exacerbates these problems, then the adverse effect of SIO on bond yield spreads would be of a larger magnitude in cases of larger default risk. What we expect to see from LIO, however, is an empirical question. On the one hand, lower financial distress risk less likely outweighs the benefits of LIO, leading to smaller LIO effects for the high risk group. On the other hand, with higher financial distress risk, there may be more room for improvements that can be attributed to LIO, so that the incremental effect of LIO is larger for the high risk group.

We categorize firms in our sample into high and low financial distress risk and test whether the two groups have equal SIO and LIO effects on future corporate yield spreads. We measure financial distress risk using three measures to ensure robustness. The results are reported in Table V. Models 1 and 2 show results when using Bharath and Shumway's

(2008) probability of default measure as a proxy for financial distress risk. In Models 3 and 4 we use investment grading as the proxy. Finally, in Models 5 and 6 we use Frank and Goyal's (2009) firm leverage (debt-to-asset ratio).[9] For the probability of default and the leverage measures, bond issuing firms that have values that are above the sample median during the quarter is categorized as having relatively high default risk.

[Insert Table V about here.]

In Models 1, 3, and 5, we report results using aggregate TIO as the key explanatory variable. We see that the benefits of institutional ownership in corporate bond pricing is only significant in the low-risk group. In all three models, the estimated coefficient for TIO in the high-default risk category is not statistically different from zero. Thus, the empirical evidence in previous studies on the benefits of bond pricing provided by firm governance are mainly driven by cases where financial distress risk is relatively low, i.e., situations where agency conflicts do not outweigh the benefits provided by institutional equity investors (e.g., Bhojraj and Sengupta, 2003).

Models 2, 4, and 6 report results when TIO is replaced by its two components, SIO and LIO. Consistent with our arguments, the adverse effect of SIO is only evident in the high-risk group. The SIO coefficients for bond issues of firms with relatively high probability of default (Model 2), with non-investment grading (Model 4), and with relatively high debt-to-assets ratio (Model 6) are 1.0259, 0.87844, and 0.9054, respectively. All coefficients are statistically significant at the 5% level. In contrast, SIO does not seem to have much effect under low financial distress risk. In two of the three models, SIO is statistically insignificant in explaining corporate yield spreads for low default risk bond issues under conventional levels.[10] These results are consistent with our argument that larger SIO is associated with

[9] Using debt-to-equity ratio gives very similar results to Frank and Goyal's (2009) measure.

[10] The only exception is Model 4 (investment grading), where SIO is negatively associated with lead bond yields for the investment-grade group. While this indicates that SIO can also be beneficial to corporate bond pricing under certain situations, the magnitude of this SIO effect is smaller than the LIO effect.

higher agency costs of leverage. SIO in the high-risk group consistently shows associations with higher corporate yield spreads that are statistically different from those exhibited in the low-risk group.

We also see overall significantly negative coefficients for LIO in both the high- and low-risk group. In Model 2 (Model 6), when using median probability of default (firm leverage ratio) as the threshold, the estimated coefficients for LIO are -1.6814 (-1.5720) for the high-risk group and -1.6322 (-1.8380) for the low-risk group. In both models, the difference between the LIO effects for the two groups of bond issues is not statistically significant. In Model 4, when we use investment grading as the determination of relative financial distress risk, the estimated coefficient for LIO is -0.1341 for the high-risk group and -2.3139 low-risk group. The two coefficients are statistically different from each other. Taken together, there is some evidence showing that LIO is more effective under low default risk states. However, the evidence is not as strong as what we find for SIO.

We take a closer look at our sample bond issues. In Table VI, we see from both Panels A (using probability of default) and Panels B (using firm leverage) that, for the 78,743 bond-quarter observations in the investment grade models above, most bond issues from firms with low default probability and/or low leverage are of investment grading. For instance, 36,369 of the bond-quarter observations are indicated as low-leverage in Panel B (i.e., having leverage ratios below the quarterly median). Within these observations, 31,718 (87.21%) are investment grade. For highly-levered observations, however, only about 50% are non-investment grade. As an example, 20,605 of the 42,374 low leverage observations are non-investment grade. Judging from the earlier results reported in Table V, the non-result for LIO in non-investment grade observations in Model Model 4 are driven primarily by those that are also highly levered.

[Insert Table VI about here.]

3.5 External Governance and Stock Volatility

Given our results thus far, the institutional equity ownership structure of a firm is related to its creditors' perception of risk on their bond investments. The investment horizons of institutions signal the managerial incentives that they provide (e.g., short-termism or long-term prospects), and thus is rationally taken into consideration in the pricing of bonds. Yet, institutional ownership structure is not the only observable dimension regarding managerial incentives when creditors price bonds. Other governance mechanisms, such as the market for corporate control, can also determine the pricing. Would the bondholders' view on institutional shareholding vary in other observable dimensions? Further, characteristics of stocks can play a role in how the agency costs and benefits weigh. Relatively volatile stocks can provide easier arbitrage opportunities for institutions if they are better-informed. Can the presence of short-term investors, along with higher volatility, exacerbate the SIO effect on bond pricing? Here, we provide two analyses to address these questions.

First, we examine how the effect of institutional heterogeneity on corporate bond pricing can be different when firm level external governance changes. We use the market for corporate control as a proxy for the external governance of firms. Firms with less anti-takeover provisions in place are more vulnerable against involuntary management replacements, and are thus viewed as more strongly governed externally. Studies have generally shown that external governance is important in the pricing of debt (e.g., Cremers et al., 2007; Chava et al., 2009). Using both the governance (GIM; G-index of Gompers et al., 2003) and entrenchment (BCF; E-index of Bebchuk et al., 2009) indices, which are count measures of anti-takeover provisions, we categorize firms into weakly (those with an index value that is above or equal to the annual sample median) and strongly (those with an index value that is below the annual sample median) governed.

[Insert Table VII about here.]

The results are reported in Models 1 (GIM) and 2 (BCF) of Table VII. For both measures, we find that the effects of SIO and LIO on bond pricing are larger in magnitudes when external governance is relatively weaker. For instance, in Model 1, the estimated coefficients for SIO and LIO are 1.3126 (t-statistic = 4.17) and -1.9614 (t-statistic = -5.24), respectively, for the observations with relatively weak external governance (i.e., high GIM values). Compared to these numbers, the estimated coefficients for SIO and LIO are -0.5956 (t-statistic = -1.42) and -0.7274 (t-statistic = -2.03), respectively, for relatively weak external governance observations (i.e., low GIM values). Altogether, in the low-GIM group (strong external governance), the SIO effect is statistically insignificant and the LIO effect is less then half of that found in the high-GIM group (weak external governance). We find qualitatively identical results using the BCF in Model 2.

When external governance from the market of corporate control is weak, it is more likely that SIO exacerbates agency conflicts of leverage. Under such a situation, there is also more room for LIO to make improvements in the firm's well-being. Our results also suggest that when the market for corporate control as a monitoring mechanism is not as effective, bondholders rely more on their observation of *existing* institutional ownership in the pricing of bonds.

Second, we examine how the effect of institutional heterogeneity on corporate bond pricing can be different under higher or lower equity volatility. We capture equity volatility using both total stock volatility and idiosyncratic volatility. We measure the stock volatility of a firm for a bond transaction/quote date using its historical average of stock returns over the last 180 days preceding that date. As in Ang et al. (2006), we measure idiosyncratic volatility using residuals from Fama-French estimations over the quarter preceding bond transaction/quote dates. Similar to the categorization of firms by external governance above, we sort firms into high (those with a volatility measure that is above or equal to the sample median) and low (those with an volatility that is below the sample median) volatility.

The results are reported in Models 3 (stock volatility) and 4 (idiosyncratic volatility) of Table VII. We find that the SIO effect on bond pricing is conditional on equity volatility, but not the LIO effect. In Model 3, the estimated coefficients for SIO and LIO are 1.0847 (t-statistic = 3.17) and -1.4983 (t-statistic = -4.36), respectively, for the observations with relatively high stock volatility. Compared to these numbers, the estimated coefficients for SIO and LIO are -0.6466 (t-statistic = -1.78) and -1.7062 (t-statistic = -4.27), respectively, for the observations with low stock volatility. The difference in SIO (LIO) between the two groups is statistically significant (insignificant) with an F-value of 24.03 (0.67). We find qualitatively identical results when using idiosyncratic volatility in Model 4.

We find support for the trading hypothesis. When equity volatility is high, institutions with stronger short-term objectives have stronger incentives to identify and take advantage of arbitrage opportunities. Under such scenario, agency costs of leverage become higher. Oppositely, institutions with long-term focus are not affected.

4 Robustness Checks

We run a battery of robustness checks to make sure that our results are not specific to the measures of key variables, nor the methodology used in the study. First, we address potential endogeneity concerns by using the 2SLS and 3SLS methodologies. We then show that our results remain qualitatively unchanged when using different measures for creditors' perception of risk and different ways of categorizing investors. Finally, we show that our results continue to hold under subsamples across time and when using alternative estimation methods.

4.1 Endogeneity

Our results thus far suggest that institutional ownership is related to the bond yield spreads of firms, and that investor heterogeneity plays an important role in bond pricing. In particular, firms with larger short-term (long-term) institutional ownership are associated with higher (lower) future bond yield spreads.

One may argue, however, that different types of institutions can have different preferences for the credit risk of firms. For example, long-term institutions are more likely to invest in large and more established companies with relatively low default risk, and are therefore associated with lower bond spreads. Our results may thus simply be an outcome of that self-selection. Further, unsystematic shocks may affect both bond spreads and institutional ownership at the same time. These can create non-zero correlations between the ownership variables and error terms in the models, introducing endogeneity. To address these potential concerns, we employ a two-stage least squares (2SLS) estimation.

One of the most important steps in this method is to find good instrumental variables (IV). IVs should be uncorrelated with the residual term and, at the same time, sufficiently correlated with the endogenous institutional ownership. We use the industry median of institutional ownership as our first IV. Industries are based on the Fama-French 48 (FF48) industry classification. Michaely and Vincent (2012) use this same IV to address endogeneity associated with total institutional ownership. Choi and Sias (2009) also document that institutional ownership tend to herd within industry. Importantly, industry median institutional ownership is not likely to be related to yield spreads, which are bond-specific, and thus qualify as a good IV. We also follow Grinstein and Michaely (2005) and use lagged values of the institutional ownership as a second IV. Given our panel data, ss in the main analyses of this paper, we follow Petersen (2009) and Gow et al. (2010) and apply two-way clustered standard errors, which simultaneously correct for time-series and cross-sectional dependencies.

In the first stage, we estimate SIO and LIO as follows:

$$\begin{aligned} \text{SIO}_t &= \alpha_0^{\text{S}} + \mathbf{Z}_t'\Lambda^{\text{S}} + \mathbf{Y}_t'\Theta^{\text{S}} + u_t^{\text{S}} \\ \text{LIO}_t &= \alpha_0^{\text{L}} + \mathbf{Z}_t'\Lambda^{\text{L}} + \mathbf{Y}_t'\Theta^{\text{L}} + u_t^{\text{L}}, \end{aligned} \tag{8}$$

where $\mathbf{Z}$ and $\mathbf{Y}$ are the matrices of the IVs and other control variables, respectively. Λ and Θ denote the vectors of estimated coefficients and u presents the vectors of first-stage errors. We then use these predicted ownership values in place of the actual ownership variables for our second stage estimation for estimating the effect of institutional ownership on bond yield spreads. Specifically, the models is:

$$\text{SPRD}_{t+1} = \beta_0 + \beta_{\text{S}}\widehat{\text{SIO}}_t + \beta_{\text{L}}\widehat{\text{LIO}}_t + \mathbf{X}_t B' + \epsilon_{t+1}, \tag{9}$$

where SPRD_{t+1} denotes bond yield spread. $\widehat{\text{SIO}}$ and $\widehat{\text{LIO}}$ are the predicted values of institutional ownership from Equation 8. $\mathbf{X}$ is the matrix of control variables for bond pricing, as discussed in Section 3.

[Insert Table VIII about here.]

Model 1 in Table VIII reports the results from this estimation. Overall, we confirm the positive effect of SIO and the negative effect of LIO on bond spreads under the two-stage setting. The estimated coefficients on the predicted ownership variables $\widehat{\text{SIO}}$ and $\widehat{\text{LIO}}$ using the 2SLS approach produce similar patterns to those reported in Table III. Specifically, they are 1.0690 (t-statistic = 2.57) for SIO and −1.7906 (t-statistic = −4.08) for LIO and are comparable to the 0.7303 and −1.6609 in Model 4 of Table III.

In addition, we use a three-stage least squares (3SLS) procedure to address contemporaneous correlation of error terms across the equations. The results of the yield spread estimation are shown in Equation 1 of Model 2, Table VIII. We estimate the system of equations for every cross section in our sample and report the average of all cross-sectional coefficients using Newey-West adjusted errors with three lags. Using this approach, we continue to find opposite effects on bond pricing from SIO and LIO. The estimated coefficients on SIO and LIO are 1.0460 and −2.8700, respectively. Both coefficients are statistically and economically significant.

Equations 2 and 3 in the same model present results from the SIO and LIO estimations in the simultaneous system. We see, in addition to the effect of ownership on bond pricing in Equation 1, that bond spreads also impact ownership. In particular, higher spreads are associated with larger future SIO and smaller future LIO.

Overall, based on the results presented in Table VIII, we conclude that our earlier results persist after controlling for endogeneity.

4.2 Measures for Credit Risk and Investor Heterogeneity

In this section, we consider alternative measures of credit risk and investor heterogeneity. For credit risk, we employ credit ratings and CDS spreads. For heterogeneity in institutions, we use an alternative measure of horizons proposed by Gaspar et al. (2005) and the categorization of investors according to Bushee (2001) (i.e., dedicated, quasi-indexer, and transient).

Credit ratings data are from Compustat and Bloomberg. We use two measures for ratings. The first measure is from Avramov et al. (2007), where we convert letter ratings (AAA/Aaa, AA+/Aa1, . . . , D/C) directly to numeric values (1, 2, . . . , 22). The second measure is a coarser version of ratings used in Bhojraj and Sengupta (2003), with a scale from 1 to 6, where 1 presents ratings of Aaa/AAA (prime), 2 presents ratings of Aa/AA (high grade), 3 presents ratings of A/A (upper medium grade), 4 presents ratings of Baa/BBB (lower medium grade), 5 presents ratings of Ba/BB (non-investment grade speculative), and

6 presents ratings of B/B (highly speculative).[11]

We test the relation between these bond ratings categories and institutional investment horizons using the following ordered logit model with two-way clustering errors:

$$\text{Rating}_{t+1} = \beta_0 + \beta_{\text{S}}\text{SIO}_t + \beta_{\text{L}}\text{LIO}_t + \mathbf{X}_t B^{'} + \epsilon_t, \tag{10}$$

where β and B are the estimated coefficients and ϵ is the vector of errors. $\mathbf{X}$ is the matrix of control variables that include bond, firm, and macroeconomic level characteristics. All variable definitions can be found in the Appendix.

[Insert Table IX about here.]

The results are reported in Models 1 and 2 of Table IX for the 1–22 and 1–6 measures, respectively. Models 1 and 2 present the analysis of two alternative credit ratings categories. Consistently with previously documented results, we show that if institutional investment horizon increases, the credit rating of the firm improves as well. In particular, Model 1 shows that the SIO and LIO coefficients are 3.2657 and −1.2673, respectively. Both coefficients are statistically significant at 1%. The alternative credit rating measure in Model 2 produces similar results. This is, once again, consistent with our findings on bond spreads that institutions, through their investment horizons, influence creditors' perception of the risk associated with the projected cash flows from their bond investments. Overall, these results indicate that firms with larger short-term (long-term) institutional ownership are associated with worse (better) credit ratings.

To further strengthen the link between credit risk and institutional ownership heterogeneity, we focus on a sub-sample of firms that have data available on their use of credit default swaps (CDS). Using CDS allows us to capture a different dimension of credit risk.

[11]Note that Bhojraj and Sengupta (2003) uses the decreasing scale. In particular, 1 represents highly speculative and 6 represents safe issues. We use the increasing scale for consistency with our first credit rating measure.

Blanco et al. (2005) argues that swap prices lead the credit spread market. In particular, they emphasize that an important reason why price discovery occurs in the CDS market is its higher volume of informed trading. This is especially important for this study. Since institutional investors are more likely to be informed traders, they should be able to more easily adjust their equity positions based on information flows from the CDS market.

We formally test the relation between credit default swaps and institutional investment horizons using the following specification:

$$\text{CDS}_{t+1} = \beta_0 + \beta_{\text{S}}\text{SIO}_t + \beta_{\text{M}}\text{MIO}_t + \beta_{\text{L}}\text{LIO}_t + \mathbf{X}_t B^{'} + \epsilon_t, \qquad (11)$$

where β and B are the estimated coefficients and ϵ is the vector of errors. CDS_{t+1} is the lead value of annualized CDS prices. $\mathbf{X}$ is the matrix of control variables that include bond level-characteristics, firm-level characteristics and macroeconomic controls. All variable definitions can be found in the Appendix.

We report the results in Model 3 of Table IX. Overall, we show that the insurance premium for firms held by mainly short-term institutional investors is higher. In particular, a 100% increase in SIO leads to an increase of 66 basis points in the premium. We also see that LIO does not appear to be significantly related to the future CDS prices. This is, however, subject to the sub-sample that has CDS information available. Overall, we continue to see from the CDS market evidence that creditors' perception of risk is related to firm level institutional investment horizons.

To further ensure the robustness of our empirical results, we incorporate two additional measures that capture investor heterogeneity. The first is an alternative measure for investment horizons used in Gaspar et al. (2005) and Gaspar et al. (2012). Instead of using the minimum of aggregate buy and sale in calculating churn rates, this measure uses the sum of aggregate buy and sale. Specifically, the quarterly churn rates are instead calculated as

$$\mathrm{CR}_{k,t}^{\mathrm{GMM}} \equiv \frac{|N_{j,k,t}P_{j,t} - N_{j,k,t-1}P_{j,t-1} - N_{j,k,t-1}\Delta P_{j,t}|}{\frac{1}{2}\sum_{j\in J}\left(N_{j,k,t}P_{j,t} + N_{j,k,t-1}P_{j,t-1}\right)}, \tag{12}$$

instead of that specified in Equation 2.

The second alternative measure of institutional heterogeneity is the categorization of institutions found in Bushee (2001) and Bushee and Noe (2000). These authors use a k-means clustering methodology to categorize investors as dedicated (high concentration and low turnover in equity ownership, with very little trading sensitivity to earnings), quasi-indexers (highly diversified ownership and low turnover, long-term buy-and-hold strategies), and transient (highly diversified portfolios with high turnover, momentum strategies following earnings news).

We repeat our main results using these alternative measures. Specifically, we regress future yield spreads on these two alternative measures. Model 4 in Table IX presents the model using Gaspar et al.'s (2005) measure. The estimated coefficients for SIO and LIO are 1.5249 and −1.5627, respectively. Both coefficients are statistically significant at the 1% level. Similarly, Model 6 in Table IX shows that transient institutional ownership increases future yield spreads and quasi-indexer intuitions tend to decrease them. Specifically, the coefficient on the transient IO is 2.6707 and the coefficient on the quasi-indexer IO is −2.1591. To put these number into perspective, a 100% increase in SIO (LIO) should increase (decrease) future yield spreads by 2.67% (2.16%). Dedicated intuitional ownership does not appear to have an effect on the firms' yield spread for the next quarter. These results are qualitatively similar to those presented earlier, suggesting that our findings are not specific to the employment of our choices of empirical proxies.

4.3 Additional Robustness Checks

We further run additional robustness checks to make sure that our results are not specific to methodology, sub-sample, or cutoffs in institutional ownership.

Throughout this study, we categorize institutions into two groups: Short- and long-term. While this categorization eliminates the "ease" in finding results if they are monotonic, there is no way to identify whether there is indeed monotonicity. In other words, cutting the sample at the median does not allow us to capture any non-linearity. We therefore repeat our main analysis using a tercile split that cuts TIO into SIO, MIO, and LIO, where MIO denotes institutions in the middle tercile of investment horizons. Model 1 in Table X presents the results. While we find that the positive effect of SIO increases in this specification, MIO appears to affect bond pricing similarly to LIO. The two are not statistically different.

[Insert Table X about here.]

Thus far we show that SIO and LIO have opposite impacts on bond yield spreads and credit ratings. This core finding appears to be robust across various empirical measures of our key variables. However, can it be sensitive to the methodology applied, especially when the pure cross-sectional effect is emphasized? We address this concern by employing Fama and MacBeth's (1973) methodology and using Newey and West (1987) adjusted errors with three lags. Model 2 in Table X shows that relation between the different types of ownership and bond spreads using this method. The results are, once again, qualitatively similar. Specifically, we find that a 100% increase in SIO (LIO) leads to a 0.8% increase (2.0% decrease) in bond spreads on average.

Chichernea et al. (2014) argue that the relative importance of different types of institutional ownership changes over time. More importantly, they document that LIO dominates SIO after 2001. One can argue that our results only hold for a sub-period, and that the same findings do not necessarily hold over the entire sample period of 1995 to 2012. We address this issue by presenting the results before and after 2001, when the structural break in institutional ownership was observed in prior studies. Models 3 and 4 in Table X show these results. Overall, we find that relation stay qualitatively similar over time. It appears, however, that both the SIO and LIO effects become more positive through time. In particular, the effect of SIO (LIO) before and after 2001 is 0.5946 and 0.9183 (-3.0043 and -2.0469), respectively. This observation is likely due to the fact that trading activity increased dramatically over time. For example, Campbell et al. (2001) show that individual stock volatility consistently increases relatively to the market volatility.

Finally, to test whether short- and long-term bonds have different sensitivities, we split sample by maturity at every point in time and repeat our main analysis for two sub-samples. Based on the results presented by Models 5 and 6 in Table X the short-term bonds are more sensitive to the effects of institutional ownership. It is consistent with the idea that credit spreads of short-term bonds also reflect liquidity concerns, and institutional investors are naturally attracted by large and liquid companies.

5 Conclusions

We examine how heterogeneity in institutional investment horizons can affect bond investors. We show that firms with larger short-term (long-term) institutional ownership are associated with higher (lower) future bond yield spreads. The effect of short (long) horizons is mainly driven by more concentrated (diffused) institutional holdings. While the effect of short-term ownership primarily takes place in firms with higher financial distress risk, stronger management rights, and higher stock volatility, effect of long-term ownership appears to be more systematic.

In sum, our results support the argument that different types of institutions affect bond pricing differently. Further, the dynamics that different institutions play in this pricing relation are through different channels. An institution's investment horizon signals its preferences for monitoring, information, and trading behavior. Through incentivizing management choices, these institutional preferences impact bondholders' perception of the risk associated with their investments, leading them to price accordingly.

References

Agrawal, Anup, and Gershon N. Mandelker, 1990, Large shareholders and the monitoring of managers: The case of antitakeover charter amendments, *Journal of Financial and Quantitative Analysis* 25, 143–161.

Altman, Edward I., 1968, Financial ratios, discriminant analysis and the prediction of corporate bankruptcy, *Journal of Finance* 23, 589–609.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2006, The cross-section of volatility and expected returns, *Journal of Finance* 61, 259–299.

Avramov, Doron, Tarun Chordia, Gergana Jostova, and Alexander Philipov, 2007, Momentum and credit rating, *Journal of Finance* 62, 2503–2520.

Barclay, Michael J., and Clifford G. Holderness, 1992, The law and large-blocktrades, *Journal of Law and Economics* 35, 265–294.

Barclay, Michael J., Clifford G. Holderness, and Jeffrey Pontiff, 1993, Private benefits from block ownership and discounts on closed-end funds, *Journal of Financial Economics* 33, 263–291.

Bebchuk, Lucian Arye, Alma Cohen, and Allen Ferrell, 2009, What matters in corporate governance?, *Review of Financial Studies* 22, 783–827.

Bharath, Sreedhar T., and Tyler Shumway, 2008, Forecasting default with the merton distance to default model, *Review of Financial Studies* 21, 1339–1369.

Bhojraj, Sanjeev, and Partha Sengupta, 2003, Effect of corporate governance on bond ratings and yields: The role of institutional investors and outside directors, *Journal of Business* 76, 455–475.

Billett, Matthew T., Mark J. Flannery, and Jon A. Garfinkel, 1995, The effect of lender identity on a borrowing firm's equity return, *Journal of Finance* 50, 699–718.

Blanco, Roberto, Simon Brennan, and Ian W. Marsh, 2005, An empirical analysis of the dynamic relation between investment-grade bonds and credit default swaps, *Journal of Finance* 60, 2255–2281.

Bushee, Brian, 2001, Do institutional investors prefers near-term earnings over long-run value?, *Contemporary Accounting Research* 18, 207–246.

Bushee, Brian, and Chris Noe, 2000, Corporate disclosure practices, institutional investors, and stock return volatility, *Journal of Accounting Research* 38, 171–202.

Bushee, Brian J., 1998, The influence of institutional investors on myopic R&D investment behavior, *Accounting Review* 73, 305–333.

Campbell, John Y., Martin Lettau, Burton G. Malkiel, and Yexiao Xu, 2001, Have individual stocks become more volatile? an empirical exploration of idiosyncratic risk, *Journal of Finance* 56, 497–513.

Campbell, John Y., and Glen B. Taksler, 2003, Equity volatility and corporate bond yields, *Journal of Finance* 58, 2321–2350.

Chava, Sudheer, Dmitry Livdan, and Amiyatosh Purnanandam, 2009, Do shareholder rights affect the cost of bank loans?, *Review of Financial Studies* 22, 2973–3004.

Chichernea, Doina, Alex Petkevich, and Blerina Reca, 2014, Idiosyncratic volatility, institutional ownership, and investment horizon, *European Financial Management* forthcoming.

Choi, Nicole, and Richard Sias, 2009, Institutional industry herding, *Journal of Financial Economics* 94, 469491.

Cremers, K. J. Martijn, Vinay B. Nair, and Chenyang Wei, 2007, Governance mechanisms and bond prices, *Review of Financial Studies* 20, 1359–1388.

Cremers, Martijn, and Ankur Pareek, 2014, Short-term trading and stock return anomalies: Momentum, reversal, accruals, share issuance and R&D increases, *Review of Finance* Forthcoming.

Dechow, Patricia M., and Richard G. Sloan, 1991, Executive incentives and the horizon problem: An empirical investigation, *Journal of Accounting and Economics* 14, 51–89.

Derrien, François, Ambrus Kecskés, and David Thesmar, 2014, Investor horizons and corporate policies, *Journal of Financial and Quantitative Analysis* forthcoming.

Fama, Eugene F., and James D. MacBeth, 1973, Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607–636.

Francis, Bill B., Iftekhar Hasana, Kose John, and Maya Waisman, 2010, The effect of state antitakeover laws on the firm's bondholders, *Journal of Financial Economics* 96, 127–154.

Frank, Murray Z., and Vidhan K. Goyal, 2009, Capital structure decisions: Which factors are reliably important?, *Financial Management* 38, 1–37.

Garlappi, Lorenzo, and Hong Yan, 2011, Financial distress and the cross-section of equity returns, *Journal of Finance* 66, 789–822.

Gaspar, José-Miguel, Massimo Massa, and Pedro Matos, 2005, Shareholder investment horizons and the market for corporate control, *Journal of Financial Economics* 76, 135–165.

Gaspar, José-Miguel, Massimo Massa, Pedro Matos, Rajdeep Patgiri, and Zahid Rehman, 2012, Payout policy choices and shareholder investment horizons, *Review of Finance* 17, 261–320.

Gillan, Stuart L., and Laura T. Starks, 2000, Corporate governance proposals and shareholder activism: The role of institutional investors, *Journal of Financial Economics* 57, 275–305.

Gompers, Paul A., Joy Ishii, and Andrew Metrick, 2003, Corporate governance and equity prices, *Quarterly Journal of Economics* 118, 107–155.

Gow, Ian D., Gaizka Ormazabal, and Daniel J. Taylor, 2010, Correcting for cross-sectional and time-series dependence in accounting research, *Accounting Review* 85, 483–512.

Graham, John R., Si Li, and Jiaping Qiu, 2008, Corporate misreporting and bank loan contracting, *Journal of Financial Economics* 89, 44–61.

Grinstein, Yaniv, and Roni Michaely, 2005, Institutional holdings and payout policy, *Journal of Finance* 60, 1389–1426.

Grossman, Sanford J., and Oliver D. Hart, 1980, Takeover bids, the free-rider problem, and the theory of the corporation, *Bell Journal of Economics* 11, 42–64.

Hackethal, Andreas, and Reinhard H. Schmidt, 2004, Financing patterns: Measurement concepts and empirical results, *working paper.*

Harford, Jarrad, Ambrus Kecskés, and Sattar Mansi, 2012, Investor horizons and corporate cash holdings, *working paper.*

Healy, Paul M., Amy P. Hutton, and Krishna G. Palepu, 1999, Stock performance and intermediation changes surrounding sustained increases in disclosure, *Contemporary Accounting Research* 16, 485–520.

Holmström, Bengt, and Jean Tirole, 1993, Market liquidity and performance monitoring, *Journal of Political Economy* 101, 678–709.

Jarrell, Gregg A., and Annette B. Poulsen, 1987, Shark repellents and stock prices : The effects of antitakeover amendments since 1980, *Journal of Financial Economics* 19, 127–168.

Jensen, Michael C., 1986, Agency costs of free cash flow, corporate finance, and takeovers, *American Economic Review* 76, 323–329.

Jensen, Michael C., and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305–360.

John, Kose, and Lubomir Litov, 2009, Corporate governance and financing policy: New evidence, *New York University working paper.*

Klock, Mark S., Sattar A. Mansi, and William F. Maxwell, 2005, Does corporate governance matter to bondholders?, *Journal of Financial and Quantitative Analysis* 40, 693–719.

McConnell, John J., and Henri Servaes, 1990, Additional evidence on equity ownership and corporate value, *Journal of Financial Economics* 27, 596–612.

Merton, Robert C., 1974, On the pricing of corporate debt: The risk structure of interest rates, *Journal of Finance* 29, 449–470.

Michaely, Roni, and Christopher Vincent, 2012, Do institutional investors influence capital structure decisions?, *Cornell University working paper.*

Monks, Robert A. G., and Nell Minow, 2011, *Corporate Governance.* (Blackwell Publishers).

Morck, Randall, Andrei Shleifer, and Robert W. Vishny, 1988, Management ownership and market valuation: An empirical analysis, *Journal of Financial Economics* 20, 293–315.

Murphy, Kevin J., 1985, Corporate performance and managerial remuneration: An empirical analysis, *Journal of Accounting and Economics* 7, 11–42.

Myers, Stewart C., 1977, Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147–175.

Newey, Whitney K., and Kenneth D. West, 1987, A simple positive definite, heteroscedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55, 703–705.

Petersen, Mitchell A., 2009, Estimating standard errors in finance panel data sets: Comparing approaches, *Review of Financial Studies* 22, 435–480.

Sengupta, Partha, 1998, Corporate disclosure quality and the cost of debt, *Accounting Review* 73, 459–474.

Shleifer, Andrei, and Robert W. Vishny, 1986, Large shareholders and corporate control, *Journal of Political Economy* 94, 461–488.

Tirole, Jean, 1996, A theory of collective reputations (with applications to the persistence of corruption and to firm quality), *Review of Economic Studies* 63, 1–22.

Yan, Xuemin (Sterling), and Zhe Zhang, 2009, Institutional investors and equity returns: Are short-term institutions better informed?, *Review of Financial Studies* 22, 893–924.

A Appendix

A.1 Variable Definitions

Panel A: Key Variables	
SPRD	Annualized bond yield less Treasury yield with closest term to maturity
TIO	Total institutional ownership
SIO/LIO	Short/long-term institutional ownership
Panel B: Issue Level Control Variables	
Maturity	Years left to maturity of the bond
Duration	Duration of the remaining life of the bond
Bond Return	Realized bond return during the past quarter
Bond Price	Bond price as percentage of par
Size of Issue	Issue size in $ millions
Panel C: Firm Level Control Variables	
Z-score	Modified Altman's (1968) *z*-score
	(`(1.2*wcapq + 1.4*req + 3.3*piq + 0.999*saleq)/atq`)
D/E	Market leverage ratio (`(dlcq + dlttq)/(prccq*cshoq)`)
Profitability	Operating income before depreciation to assets (`oibdpq/atq`)
Tangibility	Net property, plant, and equipment to assets (`ppentq/atq`)
Firm Size	Natural log of assets, CPI adjusted (`ln(atq)`)
M/B	Market-to-book assets (`(prccq*cshprq + dlcq + dlttq - txditcq)/atq`)
Beta	CAPM stock beta
Stock Return	Stock return of the issuing firm over the past quarter
Panel D: Macroeconomic Level Control Variables	
Credit Spread	Difference in yields between Baa and Aaa corporate bonds
Term Spread	Difference in yields between the 10-year and 1-year Treasury securities

Figure 1: **Credit risk and institutional ownership**

This figure documents average corporate yield spreads of portfolios sorted on short-term (SIO) and long-term (LIO) institutional ownership quintiles in the left and right panels, respectively, over the sample period of 1995–2012.

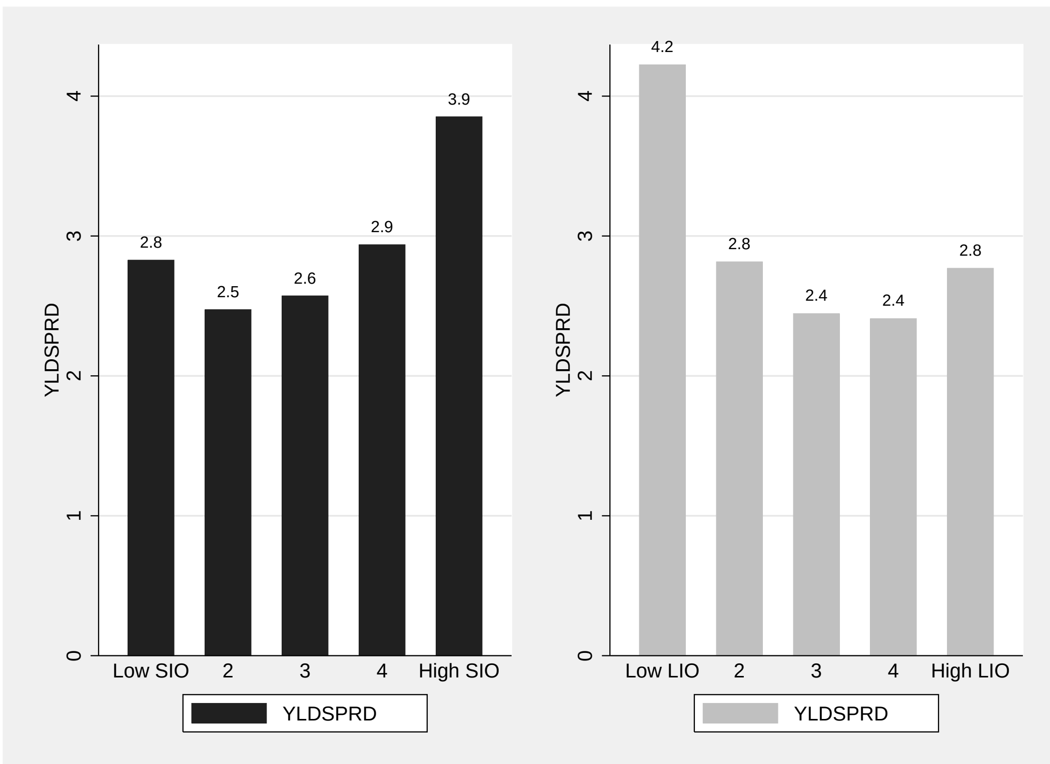

Figure 2: **Creditor and the Shareholder-Manager Link**

This figure depicts the motivation of this paper using Merton's (1974) foundation of corporate debt pricing. Without borrowing, the payoff for an unlevered owner (blue) is equal to firm value. If the firm borrows, then the firm value is split between the creditor (green) and the levered owner (red). The creditor's payoff structure is essentially a put option written on firm assets and is affected by the connection between the levered owner and the manager (black dashed).

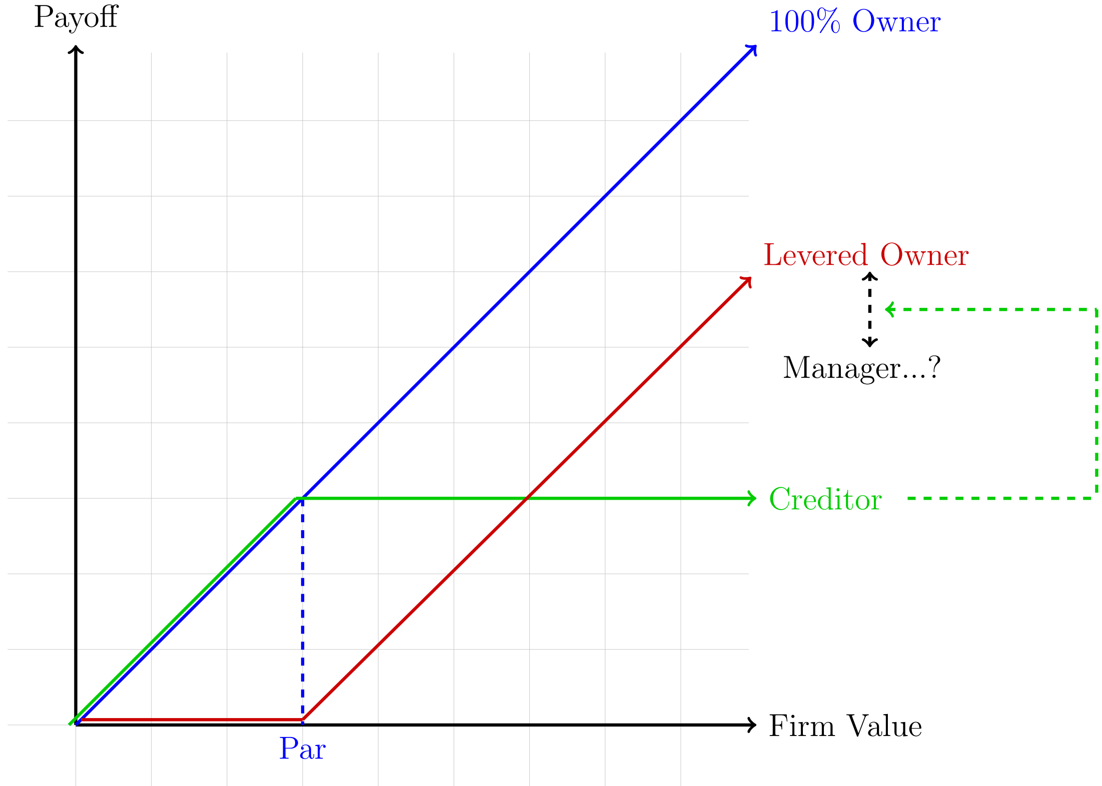

Table I: **Summary Statistics**

This table shows the descriptive statistics of variables used in the study. The definition and construction details for each variable can be found in the Appendix, Section A.

	Mean	Std Dev	10th Pct	25th Pct	50th Pct	75th Pct	90th Pct
SPRD	2.43	2.37	0.55	0.95	1.74	3.23	5.36
TIO	0.71	0.15	0.55	0.64	0.71	0.80	0.88
SIO	0.26	0.10	0.15	0.18	0.24	0.32	0.41
LIO	0.45	0.10	0.33	0.40	0.46	0.52	0.57
Maturity	10.09	11.46	1.54	3.21	6.46	13.80	24.36
Credit Rating (1–22)	8.02	2.72	5.00	6.00	8.00	10.00	11.00
CDS Spread	1.19	1.75	0.23	0.36	0.61	1.21	2.76
Bond Price	104.60	11.09	94.58	99.45	103.68	109.80	117.39
Bond Return	1.91	5.47	-2.11	0.31	1.59	3.10	6.31
Size of Issue	465.49	504.19	11.67	149.43	318.00	590.20	1052.97
Tangibility	0.38	0.23	0.11	0.18	0.31	0.54	0.72
z-score	0.77	0.56	0.17	0.50	0.78	1.07	1.44
D/E	0.50	0.77	0.12	0.19	0.31	0.56	0.91
Profitability	0.04	0.02	0.02	0.03	0.04	0.05	0.06
Firm Size	38.17	40.79	5.89	11.40	27.76	47.81	69.04
M/B	1.21	0.62	0.61	0.78	1.03	1.46	2.05
Beta	0.78	0.57	0.20	0.42	0.69	0.97	1.49
Stock Return	2.78	19.72	-17.33	-6.85	2.52	11.76	21.43
Credit Spread	1.22	0.59	0.77	0.90	1.08	1.32	1.66
Term Spread	1.91	1.15	-0.05	1.20	2.01	2.96	3.21

Table II: **Correlations**

This table presents the correlation matrix of variables used in this study. The definition and construction details for each variable can be found in the Appendix, Section A.

	SPRD	TIO	SIO	LIO	Maturity	Rating	CDS Spread	Bond Price	Bond Return	Size of Issue	Tangibility	z-score	D/E	Profitability	Firm Size	M/B	Beta	Stock Return
SPRD	1.00																	
TIO	-0.03	1.00																
SIO	0.09	0.68	1.00															
LIO	-0.13	0.69	-0.04	1.00														
Maturity	-0.02	-0.02	-0.08	0.05	1.00													
Rating	0.54	0.15	0.39	-0.18	-0.15	1.00												
CDS Spread	0.66	0.09	0.17	-0.03	-0.06	0.64	1.00											
Bond Price	-0.54	0.05	-0.07	0.13	0.11	-0.25	-0.38	1.00										
Bond Return	0.01	-0.02	0.00	-0.03	0.02	0.07	0.03	0.03	1.00									
Size of Issue	-0.13	-0.03	-0.13	0.08	0.07	-0.11	-0.01	0.22	0.02	1.00								
Tangibility	0.06	0.01	0.06	-0.05	0.02	0.11	0.01	-0.04	0.01	-0.06	1.00							
z-score	-0.34	0.08	-0.08	0.19	0.07	-0.54	-0.35	0.17	-0.04	-0.09	-0.15	1.00						
D/E	0.49	-0.11	0.04	-0.18	-0.07	0.49	0.71	-0.31	0.02	-0.06	0.10	-0.41	1.00					
Profitability	-0.24	-0.05	-0.10	0.02	0.05	-0.36	-0.31	0.13	-0.01	0.01	0.13	0.37	-0.27	1.00				
Firm Size	-0.17	-0.23	-0.33	0.01	0.14	-0.40	-0.13	0.12	-0.01	0.34	-0.04	-0.01	-0.11	0.02	1.00			
M/B	-0.23	-0.12	-0.12	-0.04	0.00	-0.42	-0.29	0.06	-0.03	-0.08	-0.10	0.35	-0.27	0.54	-0.10	1.00		
Beta	0.32	0.12	0.20	-0.03	-0.06	0.51	0.44	-0.12	0.07	-0.06	-0.03	-0.33	0.29	-0.26	-0.14	-0.25	1.00	
Stock Return	-0.01	0.00	0.02	-0.02	-0.00	0.06	-0.04	0.04	0.27	-0.01	0.02	-0.02	-0.02	0.04	-0.02	0.03	0.08	1.00

Table III: **Corporate Bond Yield Spreads and IO**

This table presents results from cross-sectional regressions of future corporate bond yield spreads on different combinations of institutional investment horizons as the key explanatory variable(s) of interest. The model specifications are variations of the following form:

$$\text{SPRD}_{t+1} = \beta_0 + \beta_{\text{S}}\text{SIO}_t + \beta_{\text{L}}\text{LIO}_t + \mathbf{X}_t B^{'} + \epsilon_t,$$

where SPRD_{t+1} is the lead corporate bond yield spread. TIO, SIO, and LIO represents the total, short-term, and long-term institutional ownerships of issuing firms, respectively. All models are estimated using Petersen's (2009) two-way clustering methodology that simultaneously controls for cross-sectional and time-series dependencies. The sample period is from 1995 to 2012. Variable definitions can be found in the Appendix.

Panel A: Baseline Models (One-Qtr-Ahead)								
	Model 1		Model 2		Model 3		Model 4	
	Estimate	t-val	Estimate	t-val	Estimate	t-val	Estimate	t-val
TIO	-0.4925	(-1.90)	-1.7190	(-4.99)	0.6825	(2.23)		
SIO			2.3808	(6.02)			0.7303	(2.35)
LIO					-2.3260	(-5.87)	-1.6609	(-4.76)
Maturity	0.0211	(2.08)	0.0230	(2.25)	0.0230	(2.25)	0.0230	(2.25)
Bond Price	-0.1144	(-10.37)	-0.1138	(-10.36)	-0.1139	(-10.35)	-0.1139	(-10.35)
Bond Return	-0.0110	(-0.54)	-0.0116	(-0.57)	-0.0116	(-0.57)	-0.0116	(-0.57)
Size of Issue	-0.0003	(-3.05)	-0.0002	(-2.69)	-0.0002	(-2.73)	-0.0002	(-2.73)
Tangibility	-0.0248	(-0.19)	-0.0639	(-0.49)	-0.0682	(-0.52)	-0.0698	(-0.53)
z-score	-0.6725	(-9.96)	-0.6195	(-9.61)	-0.6182	(-9.60)	-0.6184	(-9.61)
D/E	0.3804	(8.91)	0.3739	(8.75)	0.3756	(8.80)	0.3756	(8.80)
Profitability	3.2292	(1.57)	3.3193	(1.63)	3.2979	(1.62)	3.3018	(1.62)
Firm Size	-0.0093	(-9.28)	-0.0082	(-8.62)	-0.0082	(-8.58)	-0.0082	(-8.58)
M/B	-0.2599	(-5.19)	-0.2493	(-4.97)	-0.2479	(-4.94)	-0.2469	(-4.95)
Beta	0.4994	(6.81)	0.4570	(6.06)	0.4626	(6.16)	0.4590	(6.11)
Stock Return	-0.0058	(-3.41)	-0.0060	(-3.38)	-0.0060	(-3.41)	-0.0060	(-3.40)
Credit Spread	0.5447	(2.09)	0.5880	(2.34)	0.5880	(2.33)	0.5879	(2.34)
Term Spread	0.4532	(7.78)	0.4880	(8.01)	0.4846	(7.97)	0.4863	(7.98)
Intercept	13.9129	(11.28)	13.8624	(11.33)	13.8326	(11.30)	13.8242	(11.33)
$R2$	0.457		0.462		0.462		0.462	
N	79997		79997		79997		79997	
Panel B: Long-Term Effects with All Controls								
	Two-Qtr-Ahead		One-Yr-Ahead		Two-Yr-Ahead		Three-Yr-Ahead	
	Estimate	t-val	Estimate	t-val	Estimate	t-val	Estimate	t-val
SIO	1.1747	(2.64)	1.1890	(2.76)	1.6604	(3.90)	1.3557	(3.16)
LIO	-1.5606	(-3.70)	-1.1258	(-1.90)	-1.3071	(-2.07)	-1.0200	(-2.44)
$R2$	0.388		0.294		0.250		0.259	
N	77326		72017		55960		42844	

Table IV: **Ownership Concentration**

This table presents results from cross-sectional regressions of future corporate bond yield spreads on short-term and long-term institutional investment horizons as the key explanatory variables of interest. Ownership variables are separated according to concentrations. Model 1 (2, 3) splits ownership into institutional holdings that are less than 1% (3%, 5%) and those that are at least as much. The model specification takes the following form:

$$\text{SPRD}_{t+1} = \beta_0 + \sum_{\mathbf{d}^\alpha \in \{d^\alpha_\geq, d^\alpha_<\}} \mathbf{d}^\alpha \left(\beta_{\text{S}}^{\mathbf{d}^\alpha} \text{SIO}_t + \beta_{\text{L}}^{\mathbf{d}^\alpha} \text{LIO}_t \right) + \mathbf{X}_t B' + \epsilon_t,$$

where SPRD_{t+1} is the lead corporate bond yield spread. TIO, SIO, and LIO represents the total, short-term, and long-term institutional ownerships of issuing firms, respectively. $d^\alpha_\geq$ ($d^\alpha_<$) is a dummy variable that indicates the portion of ownership (SIO or LIO) is held by institutions that own at least a percentage α of the shares outstanding of the issuing firm, $\alpha \in \{1\%, 3\%, 5\%\}$. All models are estimated using Petersen's (2009) two-way clustering methodology. The sample period is from 1995 to 2012. Variable definitions can be found in the Appendix.

	Model 1		Model 2		Model 3	
	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val
SIO $<$ 1%	-2.2997	(-2.41)				
LIO $<$ 1%	-10.3115	(-10.30)				
SIO $\geq$ 1%	1.4326	(3.49)				
LIO $\geq$ 1%	0.0377	(0.11)				
SIO $<$ 3%			0.2756	(0.64)		
LIO $<$ 3%			-6.3322	(-11.13)		
SIO $\geq$ 3%			1.8097	(3.80)		
LIO $\geq$ 3%			0.1926	(0.54)		
SIO $<$ 5%					0.5548	(1.53)
LIO $<$ 5%					-4.0027	(-7.90)
SIO $\geq$ 5%					1.9248	(3.93)
LIO $\geq$ 5%					0.4838	(1.45)
Maturity	0.0265	(2.60)	0.0248	(2.43)	0.0252	(2.47)
Bond Price	-0.1105	(-10.19)	-0.1119	(-10.39)	-0.1115	(-10.23)
Bond Return	-0.0137	(-0.70)	-0.0134	(-0.67)	-0.0134	(-0.67)
Size of Issue	-0.0002	(-2.12)	-0.0002	(-2.34)	-0.0002	(-2.62)
Tangibility	0.1382	(1.08)	0.0090	(0.07)	0.0277	(0.22)
z-score	-0.3809	(-6.13)	-0.4576	(-7.38)	-0.4810	(-7.88)
D/E	0.3152	(7.57)	0.3262	(7.79)	0.3349	(7.98)
Profitability	4.1746	(1.85)	3.2262	(1.51)	3.4554	(1.62)
Firm Size	-0.0023	(-2.75)	-0.0051	(-6.04)	-0.0049	(-5.60)
M/B	-0.0927	(-1.86)	-0.1345	(-2.83)	-0.1843	(-3.69)
Beta	0.3838	(4.99)	0.3706	(5.00)	0.4489	(5.81)
Stock Return	-0.0063	(-3.43)	-0.0062	(-3.60)	-0.0060	(-3.27)
Credit Spread	0.6867	(2.76)	0.6011	(2.48)	0.6520	(2.63)
Term Spread	0.5104	(8.45)	0.4886	(7.89)	0.5180	(8.36)
Intercept	13.6697	(11.38)	14.0452	(11.70)	13.6631	(11.36)
*R*2	0.481		0.476		0.472	
N	79997		79997		79997	

Table V: **Financial Distress Risk**

This table presents results from cross-sectional regressions of future corporate bond yield spreads on different combinations of institutional investment horizons as the key explanatory variable(s) of interest. In each model, bond issuing firms are categorized into having low or high financial distress risk according to Bharath and Shumway's (2008) default probability in Models 1 and 2, investment grading in Models 3 and 4, and Frank and Goyal's (2009) firm leverage in Models 5 and 6. The model specifications are variations of the following form:

$$\mathrm{SPRD}_{t+1} = \beta_0 + \sum_{\mathbf{d}^{\mathrm{FDR}} \in \{d_{\mathrm{hi}}^{\mathrm{FDR}}, d_{\mathrm{lo}}^{\mathrm{FDR}}\}} \mathbf{d}^{\mathrm{FDR}} \left(\beta_{\mathrm{S}}^{\mathbf{d}^{\mathrm{FDR}}} \mathrm{SIO}_t + \beta_{\mathrm{L}}^{\mathbf{d}^{\mathrm{FDR}}} \mathrm{LIO}_t \right) + \mathbf{X}_t B' + \epsilon_t,$$

where SPRD_{t+1} is the lead corporate bond yield spread. TIO, SIO, and LIO represents the total, short-term, and long-term institutional ownerships of issuing firms, respectively. $d_{\mathrm{hi}}^{\mathrm{FDR}}$ ($d_{\mathrm{lo}}^{\mathrm{FDR}}$) is a dummy variable that indicates whether individual firms are of relatively high (low) financial distress risk. All models are estimated using Petersen's (2009) two-way clustering methodology. The sample period is from 1995 to 2012. Variable definitions can be found in the Appendix.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val
TIO (Hi PD)	-0.3647	(-1.40)										
TIO (Low PD)	-0.8542	(-3.29)										
SIO (Hi PD)			1.0259	(3.08)								
LIO (Hi PD)			-1.6814	(-4.75)								
SIO (Low PD)			-0.1145	(-0.31)								
LIO (Low PD)			-1.6322	(-4.29)								
TIO (Non-IG)					0.3779	(1.43)						
TIO (IG)					-1.8561	(-8.24)						
SIO (Non-IG)							0.8784	(2.46)				
LIO (Non-IG)							-0.1341	(-0.35)				
SIO (IG)							-1.2393	(-4.04)				
LIO (IG)							-2.3139	(-6.81)				
TIO (Hi Lev)									-0.3562	(-1.35)		
TIO (Low Lev)									-0.8127	(-3.23)		
SIO (Hi Lev)											0.9054	(2.64)
LIO (Hi Lev)											-1.5720	(-4.42)
SIO (Low Lev)											0.2445	(0.74)
LIO (Low Lev)											-1.8380	(-4.92)
Maturity	0.0219	(2.15)	0.0237	(2.32)	0.0298	(3.07)	0.0305	(3.13)	0.0220	(2.18)	0.0239	(2.35)
Bond Price	-0.1135	(-10.29)	-0.1133	(-10.29)	-0.1004	(-9.44)	-0.1004	(-9.38)	-0.1135	(-10.26)	-0.1131	(-10.25)
Bond Return	-0.0119	(-0.58)	-0.0123	(-0.61)	-0.0206	(-1.07)	-0.0206	(-1.07)	-0.0117	(-0.57)	-0.0122	(-0.60)
Size of Issue	-0.0003	(-3.19)	-0.0002	(-2.84)	-0.0002	(-2.68)	-0.0002	(-2.56)	-0.0003	(-3.28)	-0.0002	(-2.92)
Tangibility	-0.0283	(-0.21)	-0.0843	(-0.64)	-0.0576	(-0.48)	-0.0790	(-0.66)	-0.0597	(-0.46)	-0.1037	(-0.79)
z-score	-0.6298	(-9.37)	-0.5861	(-9.11)	-0.3289	(-5.21)	-0.3163	(-5.13)	-0.6257	(-9.20)	-0.5750	(-8.91)
D/E	0.3742	(8.85)	0.3669	(8.67)	0.3330	(8.11)	0.3330	(8.09)	0.3599	(8.61)	0.3557	(8.49)
Profitability	3.6633	(1.78)	3.6632	(1.80)	0.3752	(0.20)	0.3866	(0.21)	2.9067	(1.41)	3.0238	(1.48)
Firm Size	-0.0085	(-8.63)	-0.0077	(-8.36)	-0.0051	(-6.18)	-0.0047	(-5.86)	-0.0085	(-8.62)	-0.0076	(-8.01)
M/B	-0.2097	(-4.24)	-0.2114	(-4.26)	-0.1735	(-3.75)	-0.1666	(-3.59)	-0.2981	(-5.87)	-0.2830	(-5.63)
Beta	0.4443	(5.93)	0.4081	(5.34)	0.2964	(4.45)	0.2863	(4.27)	0.4970	(6.71)	0.4549	(6.09)
Stock Return	-0.0056	(-3.27)	-0.0057	(-3.24)	-0.0059	(-3.57)	-0.0060	(-3.54)	-0.0058	(-3.40)	-0.0060	(-3.39)
Credit Spread	0.5431	(2.08)	0.5848	(2.32)	0.6560	(2.60)	0.6718	(2.72)	0.5466	(2.10)	0.5893	(2.35)
Term Spread	0.4626	(8.09)	0.4941	(8.38)	0.4543	(7.90)	0.4688	(8.01)	0.4499	(7.68)	0.4827	(7.91)
Intercept	13.7870	(11.18)	13.7590	(11.25)	12.5534	(10.53)	12.5233	(10.49)	13.9185	(11.28)	13.8358	(11.32)
*R*2	0.460		0.464		0.497		0.497		0.460		0.464	
N	79997		79997		78743		78743		79997		79997	

Table VI: **Probability of Default and Leverage within Investment Grades**

This table shows how bond issues with low and high firm level financial distress risk are distributed within investment grades. Panel A uses Bharath and Shumway's (2008) probability of default as the measure for financial distress risk, and Panel B uses Frank and Goyal's (2009) firm leverage. The sample period is from 1995 to 2012.

Panel A: Probability of Default (Bharath and Shumway, 2008)			
	Low	High	Total
Investment Grade	33,973	19,514	53,487
Non-Investment Grade	3,403	21,853	25,256
Total	37,376	41,367	78,743
Panel B: Firm Leverage (Frank and Goyal, 2009)			
	Low	High	Total
Investment Grade	31,718	21,769	53,487
Non-Investment Grade	4,651	20,605	25,256
Total	36,369	42,374	78,743

Table VII: **External Governance and Equity Volatility**

This table presents results from cross-sectional regressions of future corporate bond yield spreads on short-term and long-term institutional investment horizons as the key explanatory variables of interest. Models 1 and 2 break down ownership into those that are strongly and weakly governed in the market for corporate control, as indicated by Gompers et al.'s (2003) Governance and Bebchuk et al.'s (2009) Entrenchment Indices, respectively. Firms with higher index values are relatively weaker in external governance. Models 3 and 4 break down ownership into those that have high and low equity volatility, as measured using stock and idiosyncratic volatility, respectively. All models are estimated using Petersen's (2009) two-way clustering methodology that simultaneously controls for cross-sectional and time-series dependencies. The sample period is from 1995 to 2012. Variable definitions can be found in the Appendix.

	Model 1		Model 2		Model 3		Model 4	
	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val
SIO (High GIM)	1.3126	(4.17)						
LIO (High GIM)	-1.9614	(-5.24)						
SIO (Low GIM)	-0.5956	(-1.42)						
LIO (Low GIM)	-0.7274	(-2.03)						
SIO (High BCF)			0.9969	(3.13)				
LIO (High BCF)			-1.8196	(-5.10)				
SIO (Low BCF)			-0.5485	(-1.28)				
LIO (Low BCF)			-0.9955	(-2.50)				
SIO (High Stk Vol)					1.0847	(3.17)		
LIO (High Stk Vol)					-1.4983	(-4.36)		
SIO (Low Stk Vol)					-0.6466	(-1.78)		
LIO (Low Stk Vol)					-1.7062	(-4.27)		
SIO (High Idio Vol)							1.0016	(2.97)
LIO (High Idio Vol)							-1.4900	(-4.27)
SIO (Low Idio Vol)							-0.6136	(-1.71)
LIO (Low Idio Vol)							-1.6611	(-4.43)
Maturity	0.0228	(2.22)	0.0225	(2.20)	0.0241	(2.35)	0.0236	(2.32)
Bond Price	-0.1146	(-10.41)	-0.1142	(-10.34)	-0.1136	(-10.46)	-0.1131	(-10.28)
Bond Return	-0.0115	(-0.57)	-0.0113	(-0.56)	-0.0131	(-0.65)	-0.0131	(-0.65)
Size of Issue	-0.0002	(-2.75)	-0.0002	(-2.68)	-0.0002	(-2.76)	-0.0002	(-2.92)
Tangibility	-0.0153	(-0.12)	-0.0427	(-0.33)	-0.1240	(-0.96)	-0.1302	(-1.02)
z-score	-0.6078	(-9.52)	-0.6139	(-9.53)	-0.5792	(-9.07)	-0.5795	(-9.09)
D/E	0.3843	(9.23)	0.3782	(9.02)	0.3650	(8.58)	0.3643	(8.58)
Profitability	3.2085	(1.58)	3.2696	(1.63)	3.3757	(1.65)	3.2882	(1.63)
Firm Size	-0.0084	(-8.61)	-0.0081	(-8.55)	-0.0075	(-8.23)	-0.0074	(-8.15)
M/B	-0.2470	(-5.00)	-0.2469	(-5.07)	-0.2284	(-4.61)	-0.2348	(-4.74)
Beta	0.4614	(6.19)	0.4559	(6.10)	0.3113	(3.96)	0.3525	(4.75)
Stock Return	-0.0060	(-3.44)	-0.0061	(-3.45)	-0.0060	(-3.56)	-0.0058	(-3.37)
Credit Spread	0.5819	(2.31)	0.5814	(2.30)	0.5174	(2.08)	0.5437	(2.16)
Term Spread	0.4823	(8.00)	0.4868	(7.95)	0.5092	(8.83)	0.4962	(8.50)
Intercept	13.8537	(11.34)	13.8604	(11.33)	14.0009	(11.70)	13.9262	(11.46)
$R2$	0.464		0.463		0.469		0.468	
N	79997		79997		79997		79997	

Table VIII: **Robustness: Endogeneity**

This table addresses endogeneity concerns. Model 1 shows results from a two-stage least squares (2SLS) estimation, where ownership variables TIO, SIO, and LIO are treated as endogenous. In the first stage, we estimate SIO and LIO as

$$\begin{aligned} \text{SIO}_t &= \alpha_0^{\text{S}} + \mathbf{Z}_t'\Lambda^{\text{S}} + \mathbf{Y}_t'\Theta^{\text{S}} + u_t^{\text{S}} \\ \text{LIO}_t &= \alpha_0^{\text{L}} + \mathbf{Z}_t'\Lambda^{\text{L}} + \mathbf{Y}_t'\Theta^{\text{L}} + u_t^{\text{L}}, \end{aligned}$$

where $\mathbf{Z}$ and $\mathbf{Y}$ are the matrices of the IVs and other control variables, respectively. Λ and Θ denote the vectors of estimated coefficients and u presents the vectors of first-stage errors. The predicted ownership values are then used in the second stage estimation for the effect of institutional ownership on bond yield spreads. Specifically,

$$\text{SPRD}_{t+1} = \beta_0 + \beta_{\text{S}}\widehat{\text{SIO}}_t + \beta_{\text{L}}\widehat{\text{LIO}}_t + \mathbf{X}_t B' + \epsilon_{t+1},$$

where SPRD_{t+1} denotes bond yield spread. $\widehat{\text{SIO}}$ and $\widehat{\text{LIO}}$ are the predicted values of institutional ownership obtained from the previous stage. $\mathbf{X}$ is the matrix of control variables for bond pricing. In addition, a three-stage least squares (3SLS) procedure is employed to further address possible contemporaneous correlation of error terms across the equations. The results of the yield spread estimation are shown in Equation 1 of Model 2. Equations 2 and 3 in the same model present results from the SIO and LIO estimations in the simultaneous system. In the first stage, SIO and LIO are estimated using a set of instrumental variables that include industry medians of each type of institutional ownership, as well as their lagged values. The results are reported using two-way clustered errors that simultaneously correct for time-series and cross-sectional dependencies. The sample period is from 1995 to 2012. Variable definitions can be found in the Appendix.

	Model 1 2SLS		Model 2 3SLS					
			Eq (1): SPRD		Eq (2): SIO		Eq (3): LIO	
	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val	Estimate	*t*-val
SIO	1.0690	(2.57)	1.0460	(2.96)				
LIO	-1.7906	(-4.08)	-2.8700	(-7.58)				
SPRD					0.0991	(2.34)	-0.2240	(-11.20)
Maturity	0.0176	(2.49)	0.0098	(1.12)	-0.0013	(-0.82)	0.0017	(1.12)
Bond Price	-0.1094	(-10.68)	-0.1030	(-6.03)	0.0098	(2.76)	-0.0241	(-5.37)
Bond Return	-0.0092	(-0.76)	0.0163	(1.87)	-0.0006	(-0.29)	0.0018	(1.02)
Size of Issue	-0.0002	(-2.28)	-0.0001	(-0.75)	0.0000	(4.30)	0.0000	(-0.63)
Tangibility	-0.0963	(-0.74)	-0.1580	(-1.50)	0.0380	(2.20)	-0.0121	(-0.48)
z-score	-0.6014	(-9.56)	-0.4740	(-9.43)	0.0461	(2.70)	-0.1000	(-6.36)
D/E	0.3601	(8.65)	0.4480	(8.29)	-0.0454	(-2.08)	0.0950	(5.73)
Profitability	3.2048	(1.61)	0.1030	(0.06)	-0.3330	(-1.24)	0.3700	(0.87)
Firm Size	-0.0078	(-8.29)	-0.0078	(-5.24)	-0.0006	(-1.72)	-0.0020	(-5.75)
M/B	-0.2482	(-4.95)	-0.1380	(-3.17)	-0.0086	(-1.26)	-0.0385	(-3.86)
Beta	0.4366	(5.82)	0.5670	(6.08)	0.0108	(0.50)	0.1280	(5.74)
Stock Return	-0.0059	(-3.34)	-0.0013	(-0.87)	0.0005	(2.11)	0.0005	(1.29)
Credit Spread	0.5936	(2.43)						
Term Spread	0.4897	(8.28)						
Intercept	13.3423	(11.72)	13.8100	(7.10)	-1.006	(-2.21)	3.3780	(6.66)

Table IX: **Robustness: Alternative Measures of Key Variables**

This table presents results from cross-sectional regressions of creditors' perception of risk on institutional ownership type as the key explanatory variables of interest. Particularly, alternative measures of the key variables in this study are used to ensure robustness (i.e., different measures of credit risk and investors heterogeneity). The model specifications are variations of the following form:

$$\text{RISK}^{\text{Creditor}}_{t+1} = \beta_0 + \sum_{\text{H}} \beta_{\text{H}}\text{HIO}_t + \mathbf{X}_t B' + \epsilon_t,$$

where $\text{RISK}^{\text{Creditor}}_{t+1}$ is some measure for creditors' perception of risk and HIO are measures of institutional ownership categorized in different ways. Models 1, 2, and 3 use Avramov et al.'s (2007) 1–22 credit ratings, Bhojraj and Sengupta's (2003) 1–6 credit ratings, and CDS spreads as the alternative measures for credit risk. Models 4 and 5 use Gaspar et al.'s (2005) investment horizons and Bushee's (2001) categorization of institutions (dedicated, transient, and quasi-indexers) as the alternative measures for investor heterogeneity. Models 1 and 2 are ordered logit models. All models are estimated using Petersen's (2009) two-way clustering methodology. The sample period is from 1995 to 2012. Variable definitions can be found in the Appendix.

	Model 1 1–22 Ratings		Model 2 1–6 Ratings		Model 3 CDS		Model 4 SPRD		Model 5 SPRD	
	Estimate	t-val	Estimate	t-val	Estimate	t-val	Estimate	t-val	Estimate	t-val
SIO	3.2657	(10.33)	3.6165	(10.21)	0.6575	(2.28)				
LIO	-1.2673	(-4.96)	-1.4802	(-5.18)	0.2417	(1.04)				
SIO (Gaspar et al.)							1.5249	(4.06)		
LIO (Gaspar et al.)							-1.5627	(-4.54)		
Transient IO									2.6707	(7.04)
Quasi-Indexer IO									-2.1591	(-6.16)
Dedicated IO									-0.1623	(-0.33)
Maturity	-0.0141	(-3.77)	-0.0150	(-3.95)	-0.0012	(-0.52)	0.0228	(2.22)	0.0236	(2.30)
Bond Price	-0.0169	(-4.34)	-0.0104	(-2.48)	-0.0261	(-5.75)	-0.1141	(-10.28)	-0.1154	(-10.53)
Bond Return	0.0136	(2.23)	0.0121	(1.93)	0.0039	(0.39)	-0.0123	(-0.60)	-0.0107	(-0.53)
Size of Issue	0.0003	(3.82)	0.0004	(5.57)	0.0002	(5.31)	-0.0002	(-2.62)	-0.0002	(-2.69)
Tangibility	-0.2348	(-1.82)	-0.4151	(-2.87)	0.1591	(1.41)	-0.0388	(-0.30)	-0.0528	(-0.41)
z-score	-1.2231	(-17.72)	-1.1734	(-14.17)	-0.1262	(-2.21)	-0.5961	(-9.32)	-0.5666	(-8.85)
D/E	0.3133	(7.97)	0.5818	(6.55)	1.2302	(9.00)	0.3769	(8.95)	0.3694	(8.88)
Profitability	1.2818	(0.74)	2.1118	(1.08)	-6.0714	(-2.99)	2.7789	(1.33)	2.7644	(1.39)
Firm Size	-0.0211	(-15.57)	-0.0236	(-19.37)	-0.0047	(-6.22)	-0.0079	(-8.34)	-0.0080	(-8.24)
M/B	-0.9992	(-14.41)	-0.9172	(-12.38)	-0.0113	(-0.25)	-0.2504	(-4.95)	-0.2736	(-5.59)
Beta	0.8296	(13.66)	0.9114	(13.15)	0.5225	(6.94)	0.4480	(5.74)	0.3738	(5.19)
Stock Return	0.0012	(0.85)	0.0021	(1.15)	-0.0048	(-2.51)	-0.0062	(-3.32)	-0.0066	(-3.83)
Credit Spread	-0.2615	(-4.92)	-0.2561	(-4.45)	0.4008	(7.43)	0.5908	(2.35)	0.5832	(2.29)
Term Spread	0.0328	(0.95)	0.0179	(0.48)	0.1092	(4.44)	0.4836	(8.05)	0.4613	(7.97)
Intercept					2.2966	(3.66)	13.8339	(11.24)	14.2404	(11.66)

Table X: **Robustness: Subsamples and Alternative Estimation Methods**

This table presents results from cross-sectional regressions of future corporate bond yield spreads on short-term and long-term institutional investment horizons as the key explanatory variables of interest. The earlier baseline model is re-estimated using different cuts in investor categorization, methodology, and subsamples to ensure robustness. The model specification takes the following form:

$$\text{SPRD}_{t+1} = \beta_0 + \beta_{\text{S}}\text{SIO}_t + \beta_{\text{L}}\text{LIO}_t + \mathbf{X}_t B^{'} + \epsilon_t,$$

where SPRD_{t+1} is the lead corporate bond yield spread. TIO, SIO, and LIO represents the total, short-term, and long-term institutional ownerships of issuing firms, respectively. Model 1 reports results using the same institutional investment horizon proxy of Yan and Zhang (2009) as in the baseline results, but cutting the sample investors by terciles. Model 2 reports estimations using the Fama and MacBeth's (1973) method. Models 3 and 4 conduct subsample analyses given prior empirical findings of a structural break in the importance of institutions (e.g., Chichernea et al., 2014). Models 5 and 6 conduct subsample analyses for differences in the maturity of bond issues. All models are estimated using Petersen's (2009) two-way clustering methodology. The sample period is from 1995 to 2012. Variable definitions can be found in the Appendix.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Terciles		Fama-MacBeth		Before 2001		After 2001		Short-Term		Long-Term	
	Estimate	t-val	Estimate	t-val	Estimate	t-val	Estimate	t-val	Estimate	t-val	Estimate	t-val
SIO (YZ Tercile)	3.2141	(7.37)										
MIO (YZ Tercile)	-1.4629	(-5.23)										
LIO (YZ Tercile)	-1.4224	(-2.91)										
SIO			0.7977	(3.59)	0.5946	(2.12)	0.9183	(2.59)	1.4086	(3.95)	0.3498	(1.06)
LIO			-2.0264	(-9.67)	-3.0043	(-6.00)	-2.0469	(-5.89)	-1.6911	(-4.58)	-1.1868	(-3.02)
Maturity	0.0185	(2.57)	0.0033	(0.30)	-0.0126	(-1.79)	0.0209	(2.65)	0.1377	(3.37)	0.0129	(2.09)
Bond Price	-0.1096	(-10.74)	-0.1008	(-5.98)	-0.1732	(-9.42)	-0.1005	(-9.54)	-0.2064	(-15.92)	-0.0717	(-8.14)
Bond Return	-0.0090	(-0.74)	0.0192	(2.42)	-0.0237	(-2.35)	-0.0123	(-0.78)	-0.0305	(-2.37)	-0.0145	(-1.20)
Size of Issue	-0.0001	(-1.86)	0.0000	(0.26)	0.0003	(1.62)	-0.0003	(-3.61)	-0.0002	(-1.63)	-0.0001	(-0.96)
Tangibility	-0.0460	(-0.35)	-0.1106	(-1.08)	-0.3855	(-1.80)	0.0292	(0.21)	-0.0547	(-0.36)	-0.1332	(-0.96)
z-score	-0.5627	(-9.14)	-0.5004	(-8.23)	-0.7475	(-5.38)	-0.6352	(-9.44)	-0.6669	(-9.22)	-0.5677	(-7.27)
D/E	0.3581	(8.82)	0.4582	(8.15)	0.3365	(3.99)	0.3489	(7.72)	0.2468	(6.23)	0.3594	(6.70)
Profitability	2.2227	(1.12)	-0.2213	(-0.10)	0.8115	(0.23)	3.7327	(1.67)	3.4234	(1.49)	1.8551	(0.85)
Firm Size	-0.0075	(-8.41)	-0.0110	(-4.67)	-0.0158	(-8.50)	-0.0083	(-8.88)	-0.0127	(-10.83)	-0.0059	(-6.33)
M/B	-0.2534	(-5.08)	-0.1196	(-2.93)	-0.1107	(-1.75)	-0.2798	(-4.25)	-0.3006	(-5.23)	-0.1956	(-3.49)
Beta	0.4175	(5.66)	0.5990	(6.45)	0.6049	(4.21)	0.3823	(5.33)	0.4588	(5.82)	0.4806	(5.22)
Stock Return	-0.0063	(-3.62)	-0.0004	(-0.24)	-0.0038	(-1.64)	-0.0061	(-2.98)	-0.0040	(-2.00)	-0.0077	(-4.37)
Credit Spread	0.6285	(2.43)			0.9361	(0.97)	0.5977	(2.41)	0.7065	(3.05)	0.4484	(1.71)
Term Spread	0.4534	(8.07)			0.2736	(1.03)	0.4528	(6.47)	0.6758	(10.88)	0.3247	(5.00)
_cons	13.4409	(11.80)	13.3609	(6.98)	19.9592	(8.81)	12.7816	(10.48)	22.6148	(16.13)	9.7152	(9.58)
$R2$	0.47		0.53		0.59		0.46		0.57		0.45	
N	79997		79997		13132		66865		38536		41461	