

# **Institutional Ownership Stability and the Cost of Debt\***

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Current version: September 24, 2007

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# **Institutional Ownership Stability and the Cost of Debt**

## **Abstract**

This study documents that stability of institutional ownership plays an important role in determining the cost of debt. The rationale is that long-term institutional investors are in a good position to learn about the firms they own and also have a stronger motivation to monitor them since they can reap larger benefits from it. Moreover, with the support of long-term institutional investors, managers can avoid their myopic behavior and focus on long-term firm performance. This can be achieved by paying more attention to building a good reputation in the debt market in order to get a lower cost of debt financing, mitigation of agency problems adversely affecting the cost of debt, and investing over longer-term horizons. After controlling for other determinants of the cost of debt, and correcting for the endogeneity of institutional ownership stability, three major results are uncovered. First, there is a robust negative relationship between the cost of debt and institutional ownership stability. Second, institutional ownership stability plays a bigger role in determining the cost of debt, than the institutional ownership level commonly used in the literature. Third, institutional ownership stability affects the cost of debt to a greater extent for firms that are subject to more severe information asymmetry, greater agency costs of debt, and larger agency costs of equity.

**JEL Classification:** *G32*

**Keywords:** Institutional ownership stability, corporate governance, agency problems, cost of debt

## **1. Introduction**

In the most recent decades, institutional investors have become the largest owners of the U.S. firms with their ownership share exceeding 50% of the U.S. stock market in 2004 (Chen et al., 2007). Shleifer and Vishny (1986), Maug (1998), and Kahn and Winton (1998) model the tradeoff faced by institutional investors between shared benefits gained from active monitoring of the firms owned, and private benefits obtained from trading on information. The finding from these studies is that different institutional investors have different investment agendas; some choose to monitor the firms and exert influence on the management, while others focus on information gathering and short-term trading profits.

The choice between the two strategies can be driven by shareholding stability; stable institutional investors are more likely to engage in monitoring and influencing the managers, while unstable (short-term-focused) shareholding goes hand in hand with frequent trading based on information (Chen et al., 2007). As an example of direct monitoring and exerting influence, institutional investors such as CalPERS and TIAA-CREF led shareholder activism to pressure the management of firms to improve firm performance (Smith, 1996; Wahal, 1996). As an example of indirect action through trading, Parrino et al. (2003) report that aggregate institutional ownership and the number of institutional investors decline in the year prior to forced CEO turnover, providing evidence of “voting with their feet” by dissentient investors.

Studies focusing on short-term-focused institutional investors include Bushee (1998, 2001) and Gaspar et al. (2005), among others. Bushee (1998, 2001) document that ownership of firms by institutional investors with high portfolio turnover is positively associated with the firm’s expected near-term earnings and the probability that managers reduce R&D to meet short-term earning goals. Gaspar et al. (2005) show that presence of institutional investors with higher turnover portfolios is associated with undisciplined management decision in M&A cases.

Existing studies on the effects of institutional ownership on firm value and bondholder wealth generally focus on the proportion of the shares held by institutional investors. For example, McConnell and Servaes (1990) find a positive relationship between the level of institutional ownership and firm's Tobin's Q. Similarly, Bhojraj and Sengupta (2003) show that firms with greater institutional ownership proportions have lower yields and higher ratings on newly issued bonds. These studies completely disregard the role of institutional shareholding stability, in spite of the well-established evidence associating this factor with the outcomes of anti-takeover amendments, R&D investments, and acquisition decisions (Agrawal and Mandelker, 1990; Bushee, 1998; Gaspar et al., 2005).

In this study, we aim to remedy this shortcoming by investigating the impact of institutional ownership stability on the cost of debt. We propose that both the level and the stability of institutional ownership are important in describing the monitoring incentives of institutional investors and, hence, the cost of debt. As argued by Chen et al. (2007), the benefit (cost) of monitoring increases (declines) with the duration of investment and the size of ownership. Therefore, long-term (or stable) institutional investors have a stronger motivation to monitor firms, and are able to monitor them more effectively.

We are interested in studying the economic impact of institutional ownership stability on the public bond market for the following reasons. First, public debt securities represent a significant portion of a typical corporation's value, and the public debt market represents one of the largest securities markets in the world. Second, the pricing of bonds is relatively well defined, as compared with equity pricing since bonds have precise payouts and they are less subject to the criticism that the pricing results might be driven by misspecification of the equilibrium asset pricing model. Third, the bond market allows us to assess various channels through which institutional ownership stability can influence bondholders' wealth, including

mitigation of the agency conflicts between managers and outsider investors, mitigation of the agency conflicts between equity holders and bondholders, and reduction of information risk.

A firm's cost of debt is determined by characteristics of the firm and those of the bond issue which affect default risk, agency costs, and information asymmetry problem (Bhojraj and Sengupta, 2003). Agency costs arise from the conflicts of interests between shareholders and bondholders, and shareholders and managers.<sup>1</sup> To maximize their interests as shareholders, managers may pursue riskier investment opportunities (the risk shifting problem) or under-invest in positive NPV projects (the underinvestment problem) (Jensen and Meckling, 1976; Myers, 1977). In addition, managers may pursue their personal objectives, including empire building (Jensen and Meckling, 1976), protecting their specific human capital from firm risk (Amihud and Lev, 1981), focusing only on projects with short-term payoffs (managerial myopia; Stein, 1989), and entrenchment (Shleifer and Vishny, 1989). These agency problems either reduce firm profitability and/or increase risk, thereby reducing bond value ex-ante. Since these agency problems are anticipated by bondholders, they would demand a higher yield on the debt.

Shleifer and Vishny (1986) argue that institutional shareholders, by virtue of their large stockholdings, have greater incentives to mitigate agency costs because they can have greater benefits through monitoring and enjoy greater voting powers that make it easier to take corrective action when deemed necessary. Consistent with this "active monitoring hypothesis," Jarrell and Poulsen (1987) and Brickley et al. (1988) document that institutional shareholders are more likely to vote against harmful amendments that reduce shareholder wealth. Along the same lines, Agrawal and Mandelker (1990) find a positive relationship between institutional ownership and shareholder wealth effects on various anti-takeover charter amendments.

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<sup>1</sup> To be precise, we refer to conflict of interests between shareholders and managers and conflict of interests between outsider investors (including both shareholders and bondholders) and managers. Therefore, this type of agency cost would also affect the wealth of bondholders.

Information asymmetry risk arises from the fact that managers have private information that would adversely affect the default risk of the debt. Since bondholders anticipate that managers make issuance and investment decisions based on the interests of the shareholders, they demand a higher yield on debt of firms with higher information asymmetry (Myers and Majluf, 1984). Institutional investors can potentially reduce information risk by pressing firms to disclose information in a timely manner.<sup>2</sup>

We propose that since stable institutional shareholders have bigger incentives to monitor and are able to monitor more effectively, they play a more effective role in reducing agency problems and information risk than other investors.<sup>3</sup> Moreover, institutional investors with considerable and stable shareholdings may be considered long-term investors, with whose support managers can avoid their myopic behavior and focus on long-term firm performance (Stein, 1989).<sup>4</sup> As a result, firm managers may pay more attention to building a good reputation in the debt market in order to reduce the firm's cost of debt. In particular, they have incentives to mitigate agency problems that adversely affect the cost of debt.

Stable institutional shareholders also have more incentives to collect and process information, and possess better abilities to induce timely disclosures. Therefore, stable institutional ownership may reduce the cost of debt by alleviating information asymmetry problems. Based on these arguments, we expect stable institutional ownership to result in a lower cost of debt. Furthermore, institutional ownership stability would have a larger impact on the cost of debt for firms facing more severe agency problems and/or information asymmetry.

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<sup>2</sup> Supporting this argument, Ajinkya et al. (1999) find that ratings of the overall corporate disclosure of firms are positively related to institutional stock ownership.

<sup>3</sup> Along these lines, Anderson et al. (2003) find that family ownership is associated with lower cost of debt.

<sup>4</sup> This rationale is similar to the lack of redemption pressure in the case of closed-end funds, which allows these funds to earn a higher return and to establish a niche to serve the long-term investors (Cherkes et al., 2007).

Our empirical results show that firms with more stable institutional ownership have higher credit ratings and lower yield-spreads. In terms of magnitude, a decrease of one standard deviation of institutional ownership volatility (*StdI*) is associated with a reduction of 68 basis points in bond yield-spread. Moreover, we document that ownership stability is more important in determining the cost of debt than the institutional ownership level, the variable that the existing literature is focused on. Our results are robust to alternative control variables and various model specifications and estimation techniques.

Additionally, we employ several alternative measures of institutional ownership stability, including ownership duration measures (Bohren et al, 2005) and investor turnover measures (Gaspar et al, 2005), and we obtain similar results on the negative relation between ownership stability and the cost of debt. As a further step, we also use a simultaneous equations system, where institutional ownership stability affects bond yield-spread and is influenced by the latter, and confirm that our results are not driven by the endogeneity of institutional ownership stability. Our results appear not to be confined to a particular group of institutions. Ownership stability of active institutions (investment companies and independent advisors) and passive institutions (banks and insurance companies) are both important for the cost of debt. Also, our results are not mostly driven by the largest institutions, e.g., the top 5 or 10 institutions, ownership stability of smaller institutions matters as well.

Furthermore, we find that, for firms with more severe information asymmetry, greater agency problems of debt, and greater agency problems of equity, the effect of institutional ownership stability on bond yield-spread is stronger. These results suggest that institutional ownership stability plays a more important role in firms with more severe information asymmetry and agency problems.

This paper contributes to the literature as follows. First, this study is the first to address the influence of institutional ownership stability on the cost of debt. The findings here suggest that institutional ownership stability is a more important determinant of the cost of debt than the level of institutional ownership in the sense that it can exert a larger effect on it. Second, we document that institutional ownership stability exerts a greater impact on the cost of debt for firms with greater information asymmetry and agency problems. The remainder of the paper is organized as follows. Section 2 describes the data, Section 3 presents the empirical results, and Section 4 concludes.

## **2. Sample and Data Description**

### ***2.1. Data***

Information on bonds is obtained from the Lehman Brothers Bond database (LBBD). This database contains month-end bond-specific information such as traders' quotes of bond prices and yields, coupons, credit ratings, and durations, on over 10,000 publicly traded, nonconvertible corporate bonds from January 1973 through March 1998, before it is discontinued.<sup>5</sup> Institutional ownership data, and stock returns and firm characteristics data are obtained from Thomson Financial, and CRSP and COMPUSTAT databases, respectively. To be included in the final sample, the observations must have complete bond-specific information from the LBBD, institutional ownership data in Thomson Financial database, and relevant firm-specific information from CRSP and COMPUSTAT. This yields a final sample of 13646 bond-year observations on 824 firms for the period 1990-1997.

### ***2.2. Variable Construction***

We construct three sets of variables: institutional ownership stability measures, cost of debt measures, and control variables.

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<sup>5</sup> Since bond coverage in LBBD database is less extensive in the 1970s and 1980s than in the 1990s, we restrict our bond sample to the period starting in 1990.

### 2.2.1. Measures of Institutional Ownership Stability

We construct two institutional ownership stability measures: institutional ownership volatility (*StdI*) and institutional ownership persistence (*IOP*). The institutional ownership volatility for firm *i* (*StdI<sub>i</sub>*) is the average standard deviation of institutional shareholding proportions across all investors *j* in the firm *i* ( $p_{i,t}^j$ ) over a five-year period including the sample year and the four years preceding it. This measure is calculated as:

$$StdI_i = \sum_{j=1}^{J_i} Std(p_{i,t}^j) / J_i, \quad (1)$$

In this relationship,  $p_{i,t}^j$  is the proportion of firm *i* held by investor *j* at quarter *t* ( $t = 1, 2, \dots, 20$ ),  $J_i$  is the number of institutional investors in firm *i* (according to their names over the sample period), and the 20 periods used in averaging are the 20 quarters over the 5 years' rolling sample period. The higher the ownership volatility, the lower is the ownership stability.

The second measure, institutional ownership persistence (*IOP*) for a specific institutional investor *j* in a specific firm *i*, is computed as the ratio of the average ownership proportion of investor *j* to the standard deviation of its ownership proportion, both measured over a five-year period as described above. The *IOP* measure for a particular firm *i* is then calculated as the average *IOP* across all institutional investors *j* in that particular firm. The *IOP* for a firm can be analytically described by the following equation:

$$IOP_i = \sum_{j=1}^{J_i} [(\sum_{t=1}^{20} p_{i,t}^j / 20) / Std(p_{i,t}^j)] / J_i \quad (2)$$

where  $IOP_i$  is the institutional ownership persistence measure for firm *i*,  $p_{i,t}^j$  is the proportion of firm *i* held by investor *j* at time *t*,  $J_i$  is the number of institutional investors in firm *i*, and  $Std(p_{i,t}^j)$  is the standard deviation of  $p_{i,t}^j$  across the 20 quarters. For a firm with large-stake

institutional investors and stable shareholdings, *IOP* will be large. The institutional ownership persistence measure (*IOP*) so calculated can be considered as the reciprocal of the coefficient of variation (the standard deviation scaled by the absolute value of the mean). The resulting metric is a unitless measure of variation.<sup>6</sup>

Bhojraj and Sengupta (2003) show that greater institutional ownership proportions are associated with lower yields on new bond issues. To control for the effect of institutional ownership level on the cost of debt, in the model using ownership volatility (*StdI*) as an explanatory variable, we also include the aggregate ownership proportion as an independent variable. The aggregate shareholding proportion of a firm is computed over a five-year period as:

$$Prop = \left( \sum_{t=1}^{20} \sum_{j=1}^{J_i} p_{i,t}^j \right) / 20 \quad (3)$$

### ***2.2.2. Measures of the Cost of Debt***

We use bond credit ratings and bond yield-spread to measure a firm's cost of debt. Moody's and S&P ratings are converted to numerical values using a process in which the highest rating (Aaa+ rated bonds) is assigned a value of 1 and the lowest rating (D rated bonds) receives a value of 23. Therefore, the lower the value of the rating variable, the better the credit rating, and, thus, the lower the cost of debt is expected to be.<sup>7</sup>

We construct two bond yield-spread measures (Yield Spread). The first one is the yield of a bond minus the yield on a matched Treasury security with the closest duration. The second one is the yield of a bond minus the yield on a matched Treasury security with the closest coupon and maturity. These measures are commonly used to measure the cost of debt financing (Minton and

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<sup>6</sup> The coefficient of variation has been used in the literature in the studies of cash flow volatility. For example, Minton and Schrand (1999) use the coefficient of variation of a firm's quarterly operating cash flow over the six-year period preceding each of the sample years, to measure the cash flow volatility.

<sup>7</sup> Due to space limitations, we only report the results of Moody's ratings. Results are similar across the two credit rating measures in terms of signs and both statistical and economic significance, and available on request.

Schrand., 1999; Anderson et al., 2003). These two measures offer similar results. Therefore, we only report the results of the duration-adjusted yield-spread.

### ***2.2.3. Control Variables***

Two sets of control variables are used in our analysis: firm-specific and bond-specific variables. Firm-specific variables include firm size, firm leverage, and volatility of stock returns. Bond-specific variables include bond issue-size, maturity, and age. Previous studies, such as Bhojraj and Sengupta (2003), and Klock et al. (2005), use similar control variables.

As argued in Yu (2005) and Ziebart and Reiter (1992), default risk of bonds can be represented by some accounting and financial information variables of bond issuers, such as firm size, leverage and equity volatility. Since larger firms tend to have a smaller default risk and, hence, a lower cost of debt financing, firm size is expected to be negatively associated with bond ratings and yield-spreads. Leverage is measured as book value of total debt divided by market value of total assets. A higher leverage ratio corresponds to a larger default risk, and, therefore, a higher cost of debt. The total risk of a firm is proxied by the standard deviation of the monthly stock return of the issuing firm over a twelve-month period in each year. The more volatile the stock return, the riskier the firm is, and, thus, the higher the cost of debt.

Maturity is the length of time (in years) before the bond matures and is expected to be positively related to the cost of debt because, according to liquidity premium theory, bonds with longer maturities have a greater risk (Helwege and Turner, 1999). Bond liquidity is measured by bond issue-size and bond age. Prior studies have shown that bond yield-spread is negatively (positively) related to issue-size (bond age) (Warga, 1992; Yu, 2005). This is because a larger issue-size is associated with higher liquidity, and, thus, a lower yield-spread. Also a more recently issued bond is more liquid than an older bond, and, therefore, associated with a lower yield-spread. We use the natural logarithm of the amount of bond outstanding (in thousand

dollars) to proxy for issue-size. Bond age is the length of time (in years) since the bond was issued. In addition, bond rating and yield-spread might differ significantly cross industries. Thus, we also control for industry effect by including industry dummies based on 2-digit SIC codes.

### ***2.3. Sample Descriptive Statistics***

Table 1 presents the descriptive statistics for the 13646 bond-year observations in our sample. Panel A describes the bond-specific variables. The mean (median) of Moody's rating is 6.968 (7.000), equivalent to ratings of A2. The mean (median) duration-adjusted yield-spread is 1.443% (0.859%), suggesting a positively skewed distribution. The average bond maturity and bond age are about 13 and 3 years, respectively. On average, bond issue size is about \$239 million. Panel B presents the institutional ownership variables. The mean (median) of the shareholding standard deviation (*StdI*) is 0.185% (0.134%). The mean (median) value of the *IOP* measure is 0.846 (0.792). The mean (median) of shareholding proportion (*Prop*) is 42.51% (46.36%), suggesting that about 42% of all outstanding shares of the sample firms are held by institutional investors.

Panel C presents the results on the firm-specific variables. The mean (median) of market value of total assets and leverage ratio are, respectively, \$14.677 (4.652) billion and 0.558 (0.542), indicating that firms in our sample are relatively large and have a considerable amount of debt outstanding. The mean of the monthly stock return volatility is 8.784%. Panel D describes the industry distribution of our sample based on the one-digit SIC codes. Manufacturing, transportation, and financial services industries account for most of our sample. The correlation coefficients among all the variables are reported in Table A1 in the appendix. We find that *StdI* (*IOP*) is significantly positively (negatively) correlated with bond rating variables and yield-spreads. This suggests that firms with stable institutional ownership (low *StdI* and high *IOP*) are associated with a lower cost of debt financing.

Previous research has documented that bond yield is negatively related to the level of institutional ownership (Bhojraj and Sengupta, 2003). To disentangle the effect of institutional ownership level from that of ownership stability, we disaggregate the sample according to these two variables in two steps. First, in each year we divide our sample into quintiles based on the aggregate institutional ownership proportion. Second we divide each proportion quintile into five groups according to an institutional ownership stability measure (*StdI or IOP*), and obtain 25 bond portfolios. The average yield-spread of each portfolio is reported in Table 2. In Panel A, as we move horizontally, the institutional ownership volatility measure remains unchanged but the ownership proportion varies. The results on the relationship between bond yield-spread and institutional ownership proportion are mixed. While the portfolio with the highest ownership proportion has a lower cost of debt than the one with the lowest proportion in row #1, #2, and #4, the reverse holds in row #3. The difference in row #5 is statistically insignificant.

As we examine Panel A vertically, we fix institutional ownership proportion while investigating the relationship between institutional ownership stability and bond yield-spread. For each proportion level, we observe a consistent positive relationship between yield-spread and ownership volatility, *StdI*. The difference in yield-spread between the portfolios with the highest and the lowest *StdI* (portfolios #1 and #5) is significant for all levels of ownership proportion (t-tests are reported at the bottom of Panel A). In Panel B, we observe a consistently negative relationship between yield-spread and the ownership stability measure *IOP*. Both of these findings indicate that even after we fix the level of institutional ownership, higher institutional ownership stability is associated with lower bond yield-spread. Since the cost of debt is also influenced by other firm- and bond-specific characteristics, it is important to control for these variables. Therefore, we use a multiple regression framework to explore the relation between institutional ownership stability and the cost of debt in the following sections.

### 3. Empirical Results

#### 3.1. Primary Specification

To test the cross-sectional relation between the cost of debt and institutional ownership stability, we adopt the following models, which are extensions of those in Anderson et al. (2003):

$$\begin{aligned} Ratings_{i,t} = & \beta_0 + \beta_1(StdI \text{ or } IOP)_{i,t} + \beta_2(Prop)_{i,t} + \beta_3 Firm \text{ Size}_{i,t} \\ & + \beta_4 Leverage_{i,t} + \beta_5 Volatility_{i,t} + Year \text{ Dummies}_t + Industry \text{ Dummies}_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (4)$$

$$\begin{aligned} Yield \text{ Spread}_{i,t} = & \gamma_0 + \gamma_1(StdI \text{ or } IOP)_{i,t} + \gamma_2(Prop)_{i,t} + \gamma_3 Rating \text{ Residual}_{i,t} \\ & + \gamma_4 Maturity_{i,t} + \gamma_5 Issue \text{ Size}_{i,t} + \gamma_6 Bond \text{ Age}_{i,t} + \gamma_7 Firm \text{ Size}_{i,t} + \gamma_8 Leverage_{i,t} \\ & + \gamma_9 Volatility_{i,t} + Year \text{ Dummies}_t + Industry \text{ Dummies}_{i,t} + \delta_{i,t}. \end{aligned} \quad (5)$$

The dependent variables in these two equations are Moody's credit rating, and duration-adjusted bond yield-spread, respectively. The independent variables of our interest are the ownership stability measures (*StdI* and *IOP*). We also include Maturity, IssueSize, Bond Age, FirmSize, Leverage, stock return volatility (Volatility), and dummies for each calendar year and each 2-digit SIC coded industry. In the regression with *StdI*, we also add the aggregate ownership proportion (*Prop*) to control for the effect of ownership level. In equation (5), since the credit rating variable may incorporate part or the entire impact of institutional ownership stability on the cost of debt, we orthogonalize this variable by regressing it against the measures of institutional ownership stability (*StdI* and *IOP*), and use the residual term (*Rating Residual*) as the regressor in the model. To control for the lack of independence among bonds issued by a particular firm, standard errors are clustered by firm in the regression models.

Table 3 reports the estimation results for the models specified in equations (4) and (5). Columns (1) - (4) present the results for the OLS regression explaining credit rating. As shown in column (1), the coefficient estimate on institutional ownership level (*Prop*) is insignificant while institutional ownership volatility (*StdI*) is positively and significantly (at the 1% level) related to the Moody's rating variable. In terms of the magnitude of the effect, a one standard deviation

increase in the ownership volatility (0.174%) is associated with an increase in the Moody's rating variable of 0.537 ( $0.174\% \times 100 \times 3.087$ ), the equivalent of half of one rating downgrade. Consistent with this result, the ownership stability measure (*IOP*) is negatively and significantly related to Moody's rating variable, with a one standard deviation increase in *IOP* (0.407) being associated with a decrease of 0.328 in the Moody's rating variable. This suggests that the effects of *StdI* and *IOP* on credit rating are economically, as well as statistically, significant.

We have converted credit rating into discrete numerical scores. It is, however, not clear that each notch drop in the rating implies the same effect. As a solution to this problem, we estimate ordered probit models. Results are reported in Table A2 in the appendix. As with the results in columns (1)-(4) in Table 3, the coefficient estimates of *StdI* and *IOP* are positive and negative, respectively, and they remain statistically and economically significant.

The results on the control variables are as expected. *FirmSize* is negatively and significantly related to the credit rating variable, suggesting that larger firms have better credit ratings. Leverage and stock return volatility are both positively and significantly related to credit rating because more highly leveraged firms, and firms with higher volatility, are associated with higher default risk.<sup>8</sup>

One concern is that the association between institutional ownership stability and bond rating may be due to the fact that institutional investors may index their holdings to S&P 500 firms, which are associated with lower cost of debt. Alternatively, institutional investors (especially banks) may favor safer stocks because of the prudent-man laws (Del Guercio, 1996). In these cases, the observed lower cost of debt for firms with stable institutional ownership could be contributed to by the indexing strategy, or legal constraint, rather than being an indicator of

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<sup>8</sup> We also construct *StdI*, *Prop*, and *IOP* using data over a 3, 4, 5, ..., 10 year period. Our results on *StdI*, *Prop* and *IOP* remain robust. Results of *StdI* and *Prop* are reported in Table A3.

monitoring. To test the indexing effect, we include an S&P 500 dummy in the regression of credit rating variable. Results are reported in column (3). The coefficient estimate of the S&P 500 dummy is negative and highly significant, suggesting that S&P 500 firms are indeed associated with a lower rating variable, i.e., better credit rating. However, even after we control for the indexing effect institutional ownership volatility remains significantly and positively related to the rating variable. This indicates that our findings are not driven by the indexing strategy of institutional investors. As with the result in column (1), institutional ownership proportion (*Prop*) is not significantly related to credit rating.

Following Campbell and Taksler (2003), we also extend the basic model to include the interest coverage ratio (the sum of operating income after depreciation and interest expenses, divided by interest expenses) in column (4). The coefficient estimate on *StdI* remains positive and highly significant. The coefficient estimate on *Prop* remains insignificant.

The effect of institutional ownership stability on bond yield-spread is reported in columns (5)-(9). As shown in column (5), the aggregate ownership proportion (*Prop*) is negatively related to the yield-spread (significant at 1%), indicating that a higher level of institutional ownership is associated with a lower cost of debt. This result is consistent with those documented in Bhojraj and Sengupta (2003) and Klock et al. (2005). What is more interesting though is the fact that even after controlling for the level of institutional ownership, institutional ownership volatility (*StdI*) is significantly and positively related to yield-spread. Given the size of the coefficient estimate of *StdI* in column (5), a one standard deviation decrease in *StdI* (0.174%) is associated with a reduction of 68 basis points ( $0.174\% \times 100 \times 3.902 \times 100$ ) in the yield-spread. In our sample, an average firm has \$1,021 millions of bond outstanding and, hence, it can save \$6.93 million ( $1,021 \times 0.0068$ ) in interest payment every year by reducing the institutional ownership volatility (*StdI*) by one standard deviation.

As shown in column (6), institutional ownership persistence (*IOP*) is significantly and negatively related to yield-spread, suggesting that stable institutional ownership is associated with a lower yield-spread. Given the size of the *IOP* coefficient (-0.384), a one standard deviation increase in *IOP* (0.407) is associated with a decrease of 16 basis points ( $0.384 \times 0.407 \times 100$ ) in yield-spread. This is equivalent to a total saving of \$1.60 million ( $1,021 \times 0.0016$ ) in interest payment per year. The control variables have expected signs. Overall, our results suggest that institutional ownership stability results in a lower cost of debt, and this effect is both statistically and economically significant.

In column (7), we present the result of the standardized regression models in order to compare the magnitude of the effect of aggregate ownership proportion (*Prop*) and ownership volatility (*StdI*) on the yield-spread. Following the methodology used in Bennett et al. (2003), we standardize the dependent and the independent variables by subtracting the cross-sectional mean of each year, and then dividing over the cross-sectional standard deviation. After this transformation, the variables all have the same mean (zero) and same standard deviation (one). In this way, the coefficients of *Prop* (or *StdI*) in the standardized regression can be interpreted as the expected standard deviation change in the yield-spread, given one standard deviation change in *Prop* (or *StdI*). As can be seen from the table, the absolute value of the coefficient of standardized *Prop* (-0.207) is smaller than that of the coefficient of standardized *StdI* (0.297).<sup>9</sup> This indicates that one standard deviation change in ownership volatility has a larger impact on the yield-spread than one standard deviation change in the ownership proportion, suggesting that the former may be a more important determinant of the cost of debt than the latter that is commonly used in extant studies.

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<sup>9</sup> We test the equality of the coefficients on *StdI* and *Prop*. It is rejected at the 1% level.

Some studies have used several other control variables. For example, Klock, et al. (2005) use return on assets (ROA) as a control variable assuming that profitable firms can enjoy a lower cost of debt. Klock et al. (2005) also use duration instead of maturity as a control variable to account for the influence of coupons on the yield-spread. In column (8), we replace maturity with bond duration and add ROA. With these new control variables, the coefficient of *StdI* remains positive and significant at the 1% level. In column (9), we include an S&P 500 dummy to control for the indexing effect. Again, institutional ownership volatility remains significantly and positively related to bond yield-spread. To check the robustness of the results further, we include some other control variables such as the sales growth rate from the last 3 years and 5 years, to control the growth opportunities (Klock et al., 2005), CEO ownership to control for the effects of CEO ownership influence, and ownership proportion of the top five largest institutional investors, to control for the effect of institutional ownership concentration on bond yield (Bhojraj and Sengupta, 2003). Our primary results (available upon request) remain robust.

The above results show that institutional ownership stability does matter for bond rating and yield-spread and that it may be an even more important determinant of the cost of debt than the level of institutional ownership. These results are consistent with the notion that long-term institutional investors have a stronger incentive to monitor, and they do a better job than short-term institutional investors in potentially reducing agency conflicts and information asymmetry problems.

Our measures of ownership stability are computed over a 5-year rolling window, which is potentially sensitive to mergers in the firms owned and in the institutions. M&A data from the SDC database show that about 4.7% of our institutional investors were involved in at least one merger during the sample period. Also about 58% of bond observations have their ownership stability measures computed over a 5-year rolling window in which a merger takes place. As a

robustness test, we delete these 4.7% institutions involved in mergers, and create a M&A dummy variable that equals one for firms involved in a merger during the year of merger and the subsequent four years, and zero otherwise. We then extend our primary model on bond yield-spread to include the M&A dummy and its interaction term with the ownership stability measures. Results are reported in Table A4 in the appendix. As with our earlier findings, the coefficient estimates of *StdI* and *IOP* are positive and negative, respectively, and statistically significant. The coefficient estimates of the M&A dummy and its interaction terms with *StdI* and *IOP* are statistically insignificant. These findings suggest that our results are robust to M&As in our sample firms as well as in institutions.

### ***3.2. Alternative Estimation Methods and Extended Models***

To examine the robustness of our results, we conduct additional tests as follows.

#### ***3.2.1. Time Series-Cross Sectional Regression***

In the basic model, industry characteristics likely to affect the cost of debt are controlled for by industry-specific dummies. If industry dummies do not fully capture the firm characteristics affecting the cost of debt, the omitted variables are likely to generate serial correlation in the error term resulting in unreliable estimates (Doukas and Pantzalis, 2003). Moreover, it is possible that the pooled nature of the data distorts the findings because the error structure may not be identical across firms and across time periods. To control for this problem, we use the time-series cross-section (TSCS) regression method as a robustness check. Results are presented in columns (1) and (2) of Table 4. Consistent with our basic results, *StdI* (*IOP*) is positively (negatively) associated with yield-spread (significant at 1%), indicating a lower cost of

debt for firms with more stable institutional ownership. Furthermore, the magnitudes of the coefficient estimates on *StdI* and *IOP* are similar to those in our basic models in Table 3.<sup>10</sup>

### ***3.2.2. Non-Overlapping Sample and Lagged Regression***

Our two measures of ownership stability (*StdI* and *IOP*) are computed based on institutional ownership information during a five-year rolling sample. Overlapping sample could cause interdependence among ownership stability measures over time. To address this issue, we pool observations only in 1990 and 1995, two years in which *StdI* and *IOP* are computed based on two non-overlapping windows, 1986-1990 and 1991-1995, respectively. Results based on the non-overlapping sample are reported in columns (3) and (4) of Table 4. The coefficient estimate of *StdI* (*IOP*) is positive (negative) and significant at the 1% level. These findings are consistent with our primary results and confirm the robustness of our findings.

In columns (5)-(6), we estimate the models by lagging the ownership stability measures (*StdI* and *IOP*) by 1 year. For example, the yield-spread for 1991 is regressed on ownership stability measures computed over 1986-1990. Lagged regression can shed some light on the direction of the effect in the association between ownership stability and the cost of debt. If lagged *StdI* (*IOP*) is positively (negatively) related to the subsequent bond yield spread, it is more likely that stable ownership results in a lower cost of debt, than firms with lower cost of debt attracting stable institutional investors. As shown in Table 4, lagged *StdI* (*Prop*) is significantly positively (negatively) related to yield spread at the 1% level, indicating that both lagged ownership level and lagged ownership stability are negatively related to the cost of debt. The coefficient estimate of lagged *IOP* is negative, though statistically insignificant.

### ***3.2.3. Simultaneous Equation Model***

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<sup>10</sup> To control for serial correlation which tends to inflate the t-statistics, we also used the Fama-MacBeth (1973) procedure to estimate the model. The findings are similar and support our primary results.

To further account for the endogeneity problem, following Bhojraj and Sengupta (2003), we introduce a simultaneous equation model of yield-spread and ownership stability (equations 7-8), and estimate it using the three-stage least squares (3SLS) technique:

$$\begin{aligned} \text{Yield Spread}_{i,t+3} = & \gamma_0 + \gamma_1 \text{IOP}_{i,t} + \gamma_3 \text{Rating Residual}_{i,t} + \gamma_4 \text{Maturity}_{i,t} \\ & + \gamma_5 \text{Issue Size}_{i,t} + \gamma_6 \text{Bond Age}_{i,t} + \gamma_7 \text{Firm Size}_{i,t} + \gamma_8 \text{Leverge}_{i,t} + \gamma_9 \text{Volatility}_{i,t} \\ & + \text{Year Dummies}_t + \text{Industry Dummies}_{i,t} + \delta_{i,t}, \end{aligned} \quad (6)$$

$$\begin{aligned} \text{IOP}_{i,t+3} = & \lambda_0 + \lambda_1 \text{Yield Spread}_{i,t} + \lambda_2 \text{Firm Size}_{i,t} + \lambda_3 \text{Volatility}_{i,t} \\ & + \lambda_4 \log(\text{Share Outstanding})_{i,t} + \lambda_5 \text{Share Volume Turnover}_{i,t} + \text{Year Dummies}_t \\ & + \text{Industry Dummies}_{i,t} + \eta_{i,t}, \end{aligned} \quad (7)$$

The independent variables used in the yield-spread equation (6) are the same as those in equation (5). The control variables for the *IOP* equation (7) include firm size, stock return volatility, the natural logarithm of the number of shares outstanding, and trading volume, defined as the ratio of the total number of shares traded to the number of shares outstanding. All control variables, except the last, are also used by Bhojraj and Sengupta (2003). To explore the direction of the effect between institutional ownership stability and bond yield-spread, in equation (6) the *IOP*, and in equation (7), the yield-spread are lagged three years relative to the regressand.<sup>11</sup>

The estimation results are displayed in Panel B of Table 4. In the yield-spread regression, the coefficient estimate of *IOP* is negative and significant at the 1% level, indicating that institutional ownership stability leads to a lower cost of debt in subsequent periods. The coefficient estimate of the Yield-spread in the *IOP* equation is positive and significant, suggesting that higher yield-spreads lead to greater institutional ownership stability (*IOP*) in future years. In other words, it is not the low yield spread that attracts the institutional investors

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<sup>11</sup> The use of lagged variables follows Bhojraj and Sengupta (2003) and can be justified on the grounds that yield-spread may not be an adequate explanatory variable for concurrent changes in the ownership stability measure (*IOP*) because the latter is based on the data of current and past years. Moreover, there may be a delay in the effect of ownership stability on the cost of debt because the debt market may have a long memory and may adjust to changes in ownership gradually.

and encourages them to sustain their ownership. These findings support the position that institutional ownership stability leads to a lower cost of debt.<sup>12</sup>

### ***3.3. Alternative Measures of Ownership Stability***

Above, we documented that institutional ownership stability has an important impact on the cost of debt financing. Our findings support the “active monitoring hypothesis”, suggesting that institutional investors are actively involved in monitoring firms and managers. Furthermore, our results indicate that stable (long-term) institutional investors play a more important role in reducing the cost of debt than unstable (short-term) institutional investors. To assess whether our findings are sensitive to the choice of a specific set of proxies for institutional ownership stability (e.g., *StdI* and *IOP*), we conduct the following robustness tests by employing a variety of other measures used in the literature to measure institutional ownership.

#### ***3.3.1. Orthogonalized StdI***

In the primary model, both institutional ownership volatility (*StdI*) and aggregate shareholding proportion (*Prop*) are included as measures of institutional ownership. These two variables are significantly and negatively correlated with a correlation coefficient of -0.228. Hence, it is possible that the positive coefficient of *StdI* is due to its correlation with *Prop*. To address this concern, we orthogonalize *StdI* by regressing it against *Prop*, and use the residual term (*StdI Residual*) as the regressor in the model. The coefficient of *StdI Residual* is positive and significant (column (1) in Table 5), indicating that the ownership volatility component of *StdI* that is not correlated with ownership level, is indeed a determinant of the yield-spread.

In addition, the institutional ownership volatility measure (*StdI*) used in our analysis is the average standard deviation of shareholding proportions (the sum of standard deviation of

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<sup>12</sup> We also estimate a 3SLS regression using *StdI* as a measure of ownership stability. The results are consistent with our findings on *IOP*. In the yield-spread regression, the coefficient estimate of *StdI* is positive and significant at the 1% level. The coefficient estimate of the Yield-spread in the *StdI* equation is positive and insignificant.

shareholding proportions scaled by the number of institutional investors). One concern is that the association found between ownership stability and cost of debt is driven by the reciprocal of the number of institutional investors (the denominator of *StdI*), instead of the sum of the standard deviations of shareholding proportions (the numerator). To address this issue, we use the latter variable (the numerator of *StdI*), rather than the average measure. We first orthogonalize the sum of *StdI* by regressing it against shareholding proportion (*Prop*), and then use the residual term as a regressor in the model explaining bond yield-spread. The coefficient estimate of this residual is still positive and significant, supporting our earlier findings (result available upon request).

### **3.3.2. Ownership Duration Measures**

Following Bohren et al. (2005), we construct two ownership duration measures to proxy for ownership stability. The first measure is the non-zero-points duration, which is the number of quarters in which an institutional investor has non-zero holdings out of the 20 quarters over a 5 years rolling sample period. The second measure is the maintain-stake-points duration, which is the number of quarters in which an institutional investor maintains his stake (either keeps the same proportion or increases the holding) out of the 20 quarters. Thus, the higher is the non-zero-points duration, or the maintain stake points duration, the higher is the ownership stability.

We use the average of each of these measures across all institutional investors in a firm as duration measures of the firm. These duration measures are highly correlated with our primary institutional ownership volatility measure, *StdI* ( $\rho = -0.48$  and  $-0.39$ , respectively, significant at 1%). In column (2) – (3), we relate these duration measures with bond yield-spread in our primary models. Both non-zero-points and maintain-stake-points durations are negatively related to yield-spread (significant at 1%). These results indicate that the length of time institutional

investors hold the stock or maintain their stake is negatively related to the cost of debt. This is consistent with our findings on the positive relationship between *StdI* and yield-spread.<sup>13</sup>

### ***3.3.3. Investor Turnover Measures***

Alternatively, institutional ownership stability can be measured by investor turnover of a specific firm. Gaspar et al. (2005) first calculate a turnover measure for each institutional investor, called the “churn rate”, which measures how much the investor changes his/her positions on all the stocks of his/her portfolio. The turnover measure for each firm is then calculated as the weighted “churn rates” of all the investors in the firm, with weights equal to the ratios of the holdings of individual investors to the aggregate institutional ownership of this specific firm. We label it as “Gaspar Turnover” and examine the relationship between it and bond yield-spread. Results are in column (4). The coefficient estimate of Gaspar Turnover is positive and significant, indicating that higher turnover firms have higher yield-spreads.

We also construct a Current to Last ratio, defined as the average ratio of the current ownership of an institution to its ownership of the last quarter over a rolling 5-year sample period (current and the previous four years). As shown in column (5), this measure is negatively related to bond yield-spread (significant at 5%), indicating that firms whose institutional owners increase their shareholdings over time are associated with a lower cost of debt.

These results demonstrate that our finding on the relationship between institutional ownership stability and the cost of debt is robust to a variety of measures of institutional ownership stability. Long-term institutional investors appear to be associated with greater reduction of bond yield-spread than short-term institutional investors. A notable advantage of our main measure of ownership stability, *StdI*, over the turnover measure used in Gaspar et al. (2005) is that we measure ownership volatility (*StdI*) with respect to a specific investor in a particular

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<sup>13</sup> The two duration measures are also significantly negatively related to the bond rating variable (not reported).

stock, assuming that an institutional investor might manifest different stabilities (or different trading styles) on different stocks. Gaspar et al. (2005) measure the trading styles of each institutional investor based on the turnover of that investor's portfolio and then aggregate the turnover of all the institutional investors of a firm to calculate the firm's investor turnover. These measures are based on the assumption that an institutional investor has the same trading style (high or low turnover) for all the stocks in his/her portfolio, though in reality the trading styles of an institutional investor might be quite different when investing in different stocks, depending on the his/her expertise. For example, a mutual fund manager who specializes in the pharmaceutical industry may choose to be a long-term shareholder of Merck, but could flip trading of shares of many stocks from utility or technology sectors.

### ***3.4. Different Type of Institutions***

According to Brickley et al. (1988), banks and insurance companies are regarded as passive or pressure-sensitive investors because of their potential business relationships with the companies they own. Del Guercio (1996) shows that since banks are more sensitive to the prudent-man laws, they tilt their portfolios toward prudent stocks more than mutual funds do. Due to their different investment agenda, different types of institutions might have different incentive to monitor. To explore the effect of different types of investors on our results, we classify institutional investors into three groups, passive investors (banks and insurance companies), active investors (investment companies and independent advisors), and other investors (non-financial investors). We compute ownership volatility (*StdI*) for each group of investors, and then examine the impact of ownership stability of different types of institutions on bond yield-spread. The results are reported in Table 6. The coefficient of *StdI* is positive and significant (at 1%) for both active and passive institutional investors (column (1) and (2)), but

insignificant for other investors (column (3)). These results indicate that ownership stability of both active and passive investors is an important determinant of the cost of debt financing.

We further investigate whether our results are driven by those institutions that have a larger holding and potentially a greater incentive to monitor. Following Bhojraj and Sengupta (2003) and Hartzell and Starks (2003), we identify large institutional investors, including institutions holding 5% or more of the company's stock, and the top 5 or 10 largest institutional investors, and examine how the ownership stability (*StdI*) of these large institutions affect bond yields-spread. As shown in columns (4)-(6) of Table 6, *StdI* of the institutions holding 5% or more is not significantly related to bond yield-spread. *StdI* of the top 5 or 10 largest institutional investors is positively related to bond yield-spread. However, they are only marginally significant. The sizes of the coefficient estimates of *StdI* in columns (4)-(6) of Table 6 are far smaller than those in Table 3, where *StdI* is computed based on all the institutions. These results suggest that our findings on the relationship between institutional ownership stability and the cost of debt are not largely driven by a subgroup of large institutional investors. In a theoretical model, Noe (2002) shows that incentive compatibility requires that high-endowment monitoring investors conjecture higher levels of monitoring by other investors than low-endowment monitoring investors do. Therefore, in equilibrium, the largest endowment investors are in fact monitoring less than other monitoring investors. Our results are consistent with Noe (2002).

### ***3.5. Institutional Ownership Stability, Information Asymmetry, and Bond Yield-Spread***

As we proposed earlier, stable institutional ownership may reduce the cost of debt by mitigating information asymmetry problems. If so, we would expect that institutional ownership stability would have a larger impact on the cost of debt for firms facing more severe information asymmetry problems. To test this proposition, we choose several proxies for measuring information asymmetry including firm size, analyst coverage, and residual volatility in daily

stock returns. Smaller firms have more severe information asymmetry because they disclose less information due to higher disclosure costs, and also because fewer investors would acquire information on these firms. Greater analyst coverage results in more information disclosure and less severe information asymmetry (Lang and Lundholm, 1996).<sup>14</sup> Krishnaswami and Subramaniam (1999) indicate that residual volatility in daily stock returns captures the information asymmetry between the investors and the managers about firm-specific information. Residual volatility is also the proxy for idiosyncratic risk, and we anticipate that in firms with higher idiosyncratic risk, the information asymmetry problem is more severe. Firm size is measured by the logarithm of total market value of equity plus the book value of total debt. Analyst coverage is obtained from the IBES database and is measured by the number of analysts following the firm in a given year. Residual volatility in daily stock returns is the standard deviation of the residuals from the regression of daily stock return on the market return.

To investigate whether the impact of institutional ownership stability on bond yield-spread differs between firms subject to high and low degree of information asymmetry, we construct a dummy variable (*HighInfoAsym*) that equals one if the information asymmetry variable is above the sample median, and zero otherwise. We extend the primary model to include *HighInfoAsym* and its interaction term with *StdI*. Results are reported in columns (1)-(3) of Table 7. The coefficient of the interaction term (*StdI\*HighInfoAsym*) captures the differential impact of *StdI* on yield-spread between firms with high and low levels of information symmetry. The coefficient estimates of the interaction terms are all positive and significant at the 1% level, indicating that the difference between these two subgroups is statistically significant. In terms of economic significance, a decrease of one standard deviation in institutional ownership volatility

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<sup>14</sup> Lang and Lundholm (1996) find that firms with more liberal information disclosure policies have a larger analyst following (coverage).

reduces 145.3 ( $0.174\% \times 100 \times 8.348 \times 100$ ) basis points more on bond yield-spread in smaller firms than in larger firms. We conclude that, as we proposed, institutional ownership stability has a larger impact on the cost of debt for firms subject to more severe information asymmetry.

### ***3.6. Institutional Ownership Stability, Agency Problems, and Bond Yield-Spread***

As discussed in the introduction, bond values are affected by two types of agency conflicts; conflicts between debt holders and shareholders (debt agency problem), and conflicts between shareholders and managers (equity agency problem). In this section, we investigate whether firms with higher agency cost of debt, and/or those with higher agency cost of equity, benefit differently from stable institutional ownership.

To distinguish these two types of agency costs, we use distinct proxies for each. We choose the leverage ratio (long-term debt/market value of total assets), as the proxy for agency cost of debt only. In highly leveraged firms, the conflicts between debt holders and shareholders are greater, while in contrast, the conflicts between shareholders and managers might be lower.<sup>15</sup>

To proxy for the agency costs of equity, we consider the number of anti-takeover provisions (G-index) and insider ownership (Opler et al., 1999; Gompers et al., 2003). As argued by Opler et al. (1999), with more anti-takeover provisions, the management is more protected from the market for corporate control and the potential for equity agency cost is greater. According to Morck et al. (1988), there is a nonlinear relationship between insider ownership and firm performance. To elaborate, when a manager owns only a small stake, he/she may still be disciplined toward value maximization, e.g., through the managerial labor market, the product market, and the market for corporate control. In contrast, a manager who controls a large fraction

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<sup>15</sup> This is because high leverage may reduce agency cost of equity through the threat of liquidation, which causes personal losses to managers of salaries, reputation, perquisites, etc. (Grossman and Hart, 1982; Williams, 1987). Furthermore, high leverage may restrict managers from consuming personal perks because they are forced to use the firm's cash flow to pay for interest expenses (Jensen, 1986). Therefore, we believe leverage is a good proxy for the agency cost of debt, but not the agency cost of equity.

of the firm's equity may have enough voting power or influence to guarantee his/her employment with the firm at an attractive salary, and, hence, may indulge his/ her preference for non-value-maximizing behavior. On the other hand, as a manager's equity ownership becomes very substantial, his/her own interests will be more aligned with the firm valuation and he/she would have a lower extent of non-value-maximizing behavior. Morck et al. (1988) find that when the insider ownership is between 5% and 25%, firm performance decreases with insider ownership. This suggests that agency costs of equity (or management entrenchment) are greatest when insider ownership lies within this range.

In columns (4)-(6) of Table 7, we examine the impact of institutional ownership volatility on bond yield-spread conditional on the magnitude of the agency cost of debt and the agency cost of equity. If stable institutional ownership mitigates the agency costs of debt (equity), as we proposed earlier, we would expect a stronger relationship between ownership volatility and bond yield-spread in firms subject to greater debt (equity) agency problems. In column (4), we define a High-Debt-Agency dummy that equals one for firms with leverage ratios greater than the sample median in a particular year, and zero otherwise. The coefficient estimate of *StdI* is positive and highly significant, suggesting that institutional ownership stability does matter in firms with lower degrees of debt agency problem. The coefficient estimate on the interaction term (*StdI*\*High-Debt) is found to be positive and significant, indicating that in firms with higher agency cost of debt, stable institutional ownership (lower *StdI*) reduces the cost of debt more so than in firms with lower agency cost of debt. This result supports the proposition that stable institutional ownership mitigates conflicts of interest between debt holders and shareholders (agency cost of debt). The ownership proportion (*Prop*) is significantly negatively related to bond yield-spread. However, the coefficient estimate of the interaction term (*Prop*\*High-

Agency) is positive and only marginally significant, indicating that agency costs (high leverage) partially negate the favorable effect of increased institutional ownership.<sup>16</sup>

In columns (5)-(6), we examine the effect of agency costs of equity. The High-Agency dummy in column (5) equals one for firms with G-index (or insider ownership) greater than the sample median in a particular year, and zero otherwise. The High-Agency dummy in column (6) equals one for firms with insider ownership between 5% and 25% in a particular year, and zero otherwise. The coefficient estimates of the interaction term, *StdI*\*High-Agency, in both columns (5)-(6) are positive and significant, suggesting that firms subject to higher agency costs of equity benefit more from stable institutional ownership on bond yield-spread than those subject to lower agency costs of equity.

#### **4. Conclusion**

This paper examines the impact of institutional ownership stability on the cost of debt. Our empirical results indicate that stable institutional ownership is associated with a lower cost of debt; the more stable the institutional ownership, the lower the yield-spread and the better the credit rating of the firm. This relationship is robust to alternative model specifications and estimation techniques. We also find that the ownership stability effect is stronger for firms with more severe information asymmetry and agency problems of debt and equity.

This paper complements the studies on the effect of institutional ownership level on the cost of debt, such as the work of Bhojraj and Sengupta (2003). These authors have found that increased institutional ownership level helps reduce the cost of debt. Our study contributes to the literature by examining the effect of both the ownership level (the first moment) and the ownership volatility (the second moment) of institutional ownership distribution on the cost of

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<sup>16</sup> The unexpected sign on *Prop \*Debt Agency* may be due to the correlation between *StdI* and *Prop* (-0.228). When we include only *Prop* and *Prop \* Agency* in the regression, the coefficient of this interaction term is insignificant. Results are also robust to inclusion of return on assets (ROA) as an additional explanatory variable.

debt financing. We find that institutional ownership volatility is a more important determinant of the cost of debt, than the level of institutional ownership commonly used in the literature.

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**Table 1****Descriptive Statistics of the Sample**

This table reports summary statistics for our sample during 1990-1997. Panel A-C present summary statistics on bond-specific, institutional ownership, and firm-specific variables respectively. Panel D reports the number and percentage of bond-year observations for each industry group classified according to single-digit SIC codes. For Moody's ratings, Aaa+ rated bonds are assigned a value of 1 and D-rated bonds receive a value of 23. Yield Spread is the spread between bond yield and the yield of a Treasury security with a similar duration. Maturity is the length of time (in years) before the bond matures. Duration refers to Macaulay duration and is defined as the discounted time-weighted cash flow of the bond divided by its price. Bond age is the length of time (in years) since the bond was originally issued. Issue-size is the amount of bond outstanding (in million dollars). The ownership volatility measure *StdI* is calculated as average standard deviation of shareholding proportions across all the institutional investors over a five-year period (current and past four years). Shareholding Proportion (*Prop*) is the average aggregate institutional shareholding proportion across the five-year period as defined above. The institutional ownership persistence measure (*IOP*) is calculated as the average ratio of mean to standard deviation of shareholding proportions across all the institutional investors over the five-year period as defined above. Non-zero-points duration is the number of quarters when an institutional investor has non-zero holdings out of 20 quarters over the 5 years' rolling sample period. Maintain-stake-points duration is the number of quarters when an institutional investor maintains his stake (either keep or increase the holding) out of 20 quarters. Gaspar turnover is the aggregated turnover of all investors of a firm, where investors' turnover is calculated as weighted-average of turnover of his entire portfolio. Current to last ratio is the average ratio of the current ownership of an institution to its ownership of the last quarter over a rolling 5-year sample period. Firm size is measured by the market value of total assets (market value of equity + book value of total debt). Leverage is measured as the book value of total debt divided by market value of total assets. Stock Return Volatility is the standard deviation of monthly stock return in a year. Analyst Coverage is the number of analysts following the firm in a specific year. Residual Volatility is measured by the standard deviation of the residual daily stock return from the regression of daily stock return on the value-weighted market return. Long-term leverage ratio is defined as long-term debt divided by market value of total assets. G-Index is the number of anti-takeover provisions a firm has which is used in Gompers et al. (2003). Insider ownership is defined as the ratio of the shares held by all executives divided by number of shares outstanding.

Panel A. Bond-Specific Variables							
Variable	Mean	Median	Std. Dev.	Min	25th Percentile	75th Percentile	Max
Moody's rating (Aaa+=1, D=23)	6.968	7.000	4.478	1	3	9	21
Yield Spread (%)	1.443	0.859	1.645	0	0.530	1.611	9.786
Maturity (years)	13.139	10.008	10.191	0.499	7.000	15.030	100.110
Duration (years)	5.543	5.191	3.314	0.006	3.095	7.124	29.708
Bond Age (years)	2.931	2.000	3.647	0	1	4	33
Issue Size (\$Million)	239.073	150.000	1342.541	0.001	100.000	206.000	45336.000

Panel B. Institutional Ownership Variables							
Variable	Mean	Median	Std. Dev.	Min	25th Percentile	75th Percentile	Max
StdI (%)	0.185	0.134	0.174	0	0.080	0.237	2.532
Shareholding Proportion (%)	42.507	46.357	21.337	0.001	26.052	59.754	97.436
IOP (ownership persistence)	0.846	0.792	0.407	0.130	0.556	1.047	7.284
Non-zero-points Duration	7.079	7.392	2.302	1.000	5.643	8.775	12.369
Maintain-stake-points Duration	4.576	4.758	1.279	0.500	3.873	5.475	10.727
Gaspar Turnover	0.207	0.204	0.049	0.005	0.174	0.236	0.595
Current to Last Ratio	2.599	1.657	3.850	0.703	1.512	2.180	54.214
Panel C. Firm Specific Variables							
Variable	Mean	Median	Std. Dev.	Min	25th Percentile	75th Percentile	Max
Firm Size (\$Million)	14,677	4,652	30,513	5	1,794	13,890	509,113
Leverage	0.558	0.542	0.229	0.055	0.375	0.748	1
Stock Return Volatility (%)	8.784	7.553	4.690	0.257	5.674	10.377	50.497
Analyst Coverage	17.355	16.000	10.130	2.000	9.000	24.000	54.000
Residual Volatility (%)	0.985	0.016	4.736	0.007	0.013	0.022	49.290
Long-term Leverage Ratio	0.212	0.173	0.165	0	0.083	0.301	0.881
G-Index (anti takeover provisions)	9.982	10.000	2.654	2.000	8.000	12.000	16.000
Insider Ownership (%)	9.582	3.223	17.641	0.000	1.432	7.554	97.075
Panel D. Industry Distribution							
SIC Code	Bond-Year Obs.	Industry		Obs. (%)			
0	20	Agricultural, Forestry, and Fishery		0.15			
1	567	Mining and Construction		4.16			
2	2191	Manufacturing (Food-Petroleum)		16.06			
3	1733	Manufacturing (Plastics-Electronics)		12.70			
4	1850	Transportation		13.56			
5	930	Wholesale Trade and Retail Trade		6.82			
6	5713	Finance Insurance and Real Estate		41.87			
7	312	Services (Hotel-Recreation)		2.29			
8	76	Services (Health-Private Household)		0.56			
9	254	Public Administration		1.86			
Total	13646						

**Table 2**  
**Bond Portfolios Sorted by Institutional Ownership Proportion and Stability**

This table reports average yield-spreads of 25 portfolios sorted in two dimensions: aggregate institutional shareholding proportion (*Prop*), and institutional ownership stability (*StdI* in Panel A, *IOP* in Panel B). In each year, we first divide our sample into quintiles based on the aggregate institutional ownership proportion. Next, we divide each proportion quintile into five groups according to institutional ownership stability measure (*StdI* or *IOP*). This yields 25 portfolios. The average yield-spread of each portfolio is reported in each cell. The last two columns present the yield-spread differences and t-statistics between the highest proportion portfolio and the lowest proportion portfolio in the same *StdI* or *IOP* quintile. The last two rows present the yield-spread differences and the t-statistics between the highest *StdI* or *IOP* portfolio and the lowest *StdI* or *IOP* portfolio in the same ownership proportion quintile. \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Panel A. Aggregate Proportion and <i>StdI</i>								
		<i>Prop</i> High				<i>Prop</i> Low		
		1	2	3	4	5	H-L	T-statistics.
<i>StdI</i> High	1	2.2305	2.0274	2.2405	3.0692	4.0684	-1.838	-14.69***
	2	1.2007	0.7193	0.8758	1.4811	1.6408	-0.440	-5.41***
	3	1.4681	1.7186	1.2206	1.4317	0.8613	0.607	6.50***
	4	0.8974	0.8202	0.9219	1.5532	1.6961	-0.799	-8.84***
<i>StdI</i> Low	5	0.8639	1.1191	0.9138	0.7561	0.8383	0.026	0.26
H-L		1.367	0.908	1.327	2.313	3.230		
T-statistics		10.53***	8.42***	11.99***	20.27***	35.73***		

Panel B. Aggregate Proportion and <i>IOP</i>								
		<i>Prop</i> High				<i>Prop</i> Low		
		1	2	3	4	5	H-L	T-statistics
<i>IOP</i> High	1	1.0711	0.7345	0.9255	0.8620	0.9219	0.149	1.36
	2	1.4153	0.9142	1.0832	1.2825	1.9538	-0.539	-2.57**
	3	1.1536	0.9097	1.0570	1.3751	2.5264	-1.373	-9.79***
	4	1.4772	2.0980	1.2786	1.9615	2.4914	-1.014	-7.56***
<i>IOP</i> Low	5	2.5545	1.5103	1.3905	2.5573	2.3983	0.156	0.68
H-L		-1.483	-0.776	-0.465	-1.695	-1.477		
T-statistics		-6.38***	-5.67***	-5.77***	-15.11***	-14.15***		

**Table 3****Bond Ratings, Yield-Spread and Institutional Ownership Stability**

This table reports results from the OLS regression explaining Moody's rating variable (columns (1)-(4)) and bond yield-spread (columns (5)-(9)). All variables are as defined in Table 1. Column (7) presents the result of standardized regression in which we standardize all the variables by subtracting the cross sectional mean and dividing the standard deviation of each year. We include dummies for each calendar year and each 2-digit SIC coded industry in all the regressions. Standard errors are clustered by firm in all the models. T-statistics are in parentheses. \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Sign	Dependent variable: Moody's Rating				Dependent variable: Yield-Spread				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	+/-	12.512*** (7.05)	15.135*** (11.63)	11.473*** (7.91)	11.352*** (8.31)	3.067*** (4.28)	2.898*** (5.21)	0.273** (2.05)	2.645*** (3.16)	3.119*** (4.32)
<i>StdI</i> *100	+/-	3.087*** (2.97)		3.330*** (3.37)	4.164*** (4.16)	3.902*** (8.07)		0.297*** (8.87)	4.372*** (6.61)	3.918*** (8.25)
<i>Prop</i> /100	+/-	-0.213 (-0.34)		-0.106 (-0.19)	-0.701 (-1.50)	-1.846*** (-5.27)		-0.207*** (-4.73)	-1.772*** (-6.28)	-1.874*** (-5.28)
<i>IOP</i>	+/-		-0.806*** (-2.75)				-0.384*** (-2.83)			
Rating Residual	+					0.217*** (7.90)	0.233*** (7.47)	0.422*** (8.13)	0.162*** (5.42)	0.219*** (8.87)
Maturity/100	+					0.727*** (4.00)	0.672*** (3.55)	0.049*** (3.85)		0.737*** (4.17)
Issue Size/100	-					-26.606*** (-9.46)	-21.444*** (-7.05)	-0.094*** (-7.60)	-21.261*** (-4.86)	-26.652*** (-9.49)
Bond Age/100	+					2.578*** (3.26)	2.149*** (2.73)	0.037** (2.11)	5.634*** (7.80)	2.598*** (3.31)
Firm Size	-	-1.170*** (-7.95)	-1.251*** (-10.22)	-0.954*** (-8.67)	-0.976*** (-9.45)	0.011 (0.23)	-0.087** (-2.15)	-0.042 (-0.78)	0.051 (1.03)	0.003 (0.05)
Leverage	+	7.679*** (11.60)	7.989*** (10.77)	7.138*** (11.30)	7.106*** (10.72)	1.730*** (4.29)	1.933*** (4.85)	0.272*** (4.62)	0.590 (1.62)	1.744*** (4.36)
Volatility	+	0.142*** (3.51)	0.134*** (3.16)	0.142*** (3.65)	0.113*** (2.65)	0.086*** (4.90)	0.091*** (5.57)	0.193*** (5.73)	0.078*** (5.13)	0.086*** (4.83)
S&P 500 Dummy	-			-1.471*** (-3.80)						0.071 (0.60)
ROA/100	-								-1.377* (-1.74)	
Duration/100	+								1.671 (1.55)	
Interest Coverage Ratio					-0.028** (-2.26)					
Year and Industry Dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.		13634	13634	13621	11644	12698	12698	12698	9322	12685
Pseudo R-Sq or Adj. R-Sq		0.8349	0.8362	0.8480	0.8749	0.6169	0.6250	0.6251	0.5365	0.6165

**Table 4**  
**Alternative Model Specifications and Estimation Techniques**

This table reports regression results explaining bond yield-spread with alternative model specifications and estimation techniques. Columns (1)-(2) present the results of the fixed effect cross sectional time series (CSTS) regression. Columns (3)-(4) present the results of non-overlapping regressions in which we pool observations only in the year of 1990 and 1995, and *StdI* and *IOP* are computed based on two non-overlapping sample periods, 1986-1990 and 1991-1995. In columns (3)-(4), we include industry dummies and standard errors are clustered at firm level. Column (5)-(6) present the results of lagged regressions in which one year lagged *StdI* and *IOP* are included as independent variables. In columns (5)-(6), we include industry and calendar year dummies and standard errors are clustered at firm level. Columns (7)-(8) report results of the system model estimated using the 3SLS technique. All variables are as defined in Table 1. T-statistics are reported in parentheses. \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Firm Fixed Effect Regression		Pooled Non-Overlapping Regression		Lagged Regression		A Simultaneous Equations Model (3SLS)			
	(1)	(2)	(3)	(4)	(5)	(6)	Variable	Yield-spread(t+3)	<i>IOP</i> (t+3)	
Intercept	+/-	-0.144 (-0.16)	0.230 (0.26)	1.724 (1.54)	2.189** (2.27)	2.961*** (4.20)	2.804*** (4.82)	Intercept	4.108*** (6.31)	0.495*** (6.48)
<i>StdI</i> *100	+/-	3.520*** (12.72)		4.790*** (8.74)		3.446*** (7.00)		Yield-spread(t)		0.032** (2.51)
<i>Prop</i> /100	+/-	-0.772*** (-5.40)		-1.997*** (-2.81)		-1.312*** (-3.49)		<i>IOP</i> (t)	-1.214*** (-4.60)	
<i>IOP</i>	+/-		-0.665*** (-13.73)		-0.673*** (-4.47)		-0.147 (-1.27)	Rating Residual	0.102*** (6.19)	
Rating Residual	+	0.211*** (20.96)	0.208*** (20.71)	0.269*** (7.71)	0.284*** (7.46)	0.213*** (7.09)	0.224*** (6.58)	Maturity/100	0.199 (0.67)	
Maturity/100	+	0.968*** (10.22)	0.967*** (10.18)	1.197*** (3.61)	1.118*** (3.45)	0.700*** (3.74)	0.664*** (3.31)	Issue Size/100	-8.977* (-1.89)	
Issue Size/100	-	-13.535*** (-10.00)	-15.209*** (-11.43)	-34.512*** (-5.19)	-31.741*** (-6.32)	-25.062*** (-8.67)	-22.376*** (-6.91)	Bond Age/100	-1.500 (-1.39)	
Bond Age/100	+	2.865*** (11.81)	2.785*** (11.45)	-0.992 (-0.80)	-1.888 (-1.49)	2.563*** (3.23)	2.127*** (2.71)	Firm Size	0.061 (1.06)	0.052*** (5.64)
Firm Size	-	0.170*** (4.38)	0.241*** (6.66)	0.161** (2.15)	0.068 (1.03)	-0.020 (-0.38)	-0.083* (-1.88)	Leverage	-0.144 (-0.59)	
Leverage	+	2.908*** (20.86)	2.974*** (21.32)	3.258*** (5.51)	3.487*** (5.93)	1.745*** (4.20)	1.920*** (4.55)	Volatility	0.007 (0.61)	-0.014*** (-3.99)
Volatility	+	0.024*** (6.62)	0.020*** (5.55)	0.119*** (3.31)	0.118*** (2.87)	0.088*** (4.74)	0.090*** (4.64)	Log (Shares)		0.085*** (8.97)
								Turnover		-0.041*** (-8.22)
Dummies		Year	Year	Industry	Industry	Year and Industry	Year and Industry	Dummies		
No. of obs		12698	12698	2835	2835	12418	12418	No. of obs	2579	
Adj. R-Sq		0.7568	0.7559	0.6741	0.6804	0.6100	0.6170	Adj. R-Sq	0.2220	0.3248

**Table 5**  
**Alternative Measures of Ownership Stability**

This table reports the results of regressions explaining bond yield-spread with alternative measures of ownership stability. Column (1) presents the result of regression with orthogonalized *StdI* as a measure of ownership stability. Columns (2)-(3) present the results of regressions with two ownership duration measures (Bohren et al, 2005), Columns (4) presents the result of regression with investor turnover (Gaspar et al, 2005). Column (5) presents the result of regression with Current to Last Ratio. All variables are as defined in Table 1. We include calendar year and industry dummy variables in all the regressions. Standard errors are clustered at firm level. T-statistics are reported in parentheses. \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable		Orthogonalized <i>StdI</i>	Ownership Duration Measures		Gaspar Turnover	Current to Last Ratio
			Non-zero Points	Maintain-Stake Points		
		(1)	(2)	(3)	(4)	(5)
Intercept	+/-	4.464*** (6.89)	3.932*** (7.72)	3.496*** (6.55)	-0.931 (-1.01)	2.862*** (4.82)
( <i>StdI</i> Residual)*100	+/-	3.902*** (8.07)				
Non-zero Points	+/-		-0.121*** (-3.87)			
Maintain Stake Points	+/-			-0.224*** (-4.27)		
Gaspar's Turnover	+/-				0.948** (2.04)	
Current to Last Ratio	+/-					-0.022** (-2.40)
<i>Prop</i> /100	+/-	-2.750*** (-6.98)				
Rating Residual	+	0.217*** (7.90)	0.229*** (7.16)	0.239*** (7.56)	0.215*** (18.95)	0.211*** (8.15)
Maturity/100	+	0.727*** (4.00)	0.626*** (3.46)	0.636*** (3.46)	0.944*** (9.17)	0.695*** (3.67)
Issue Size/100	-	-26.606*** (-9.46)	-20.767*** (-6.46)	-19.195*** (-6.48)	-16.019*** (-11.18)	-24.741*** (-7.61)
Bond Age/100	+	2.578*** (3.26)	2.304*** (2.91)	2.268*** (2.81)	3.004*** (11.44)	2.587*** (3.28)
Firm Size	-	0.011 (0.23)	-0.112*** (-2.80)	-0.078** (-2.15)	0.291*** (7.66)	-0.042 (-0.99)
Leverage	+	1.730*** (4.29)	1.882*** (4.67)	1.782*** (4.54)	2.857*** (17.92)	1.926*** (4.78)
Volatility	+	0.086*** (4.90)	0.095*** (6.75)	0.097*** (7.11)	0.018*** (4.61)	0.088*** (4.66)
Year and Industry Dummies		Yes	Yes	Yes	Yes	Yes
No. of obs		12698	12698	12698	11051	12674
Adj. R-Sq		0.6169	0.6226	0.6261	0.7590	0.6139

**Table 6****Ownership Stability of Different Institutions and Bond Yield-Spread**

In this table, we examine the relationship between bond yield-spread and ownership stability computed based on different types of institutions. Columns (1-3) report the results for active investors (investment companies and independent investment advisors), passive investors (banks and insurance companies), and others. Columns (4-6) report results from regressions for institutions with 5% or more holdings, the top-5 largest institutions, and the top-10 largest institutions. The institutional ownership stability measure (*StdI*) in each regression is calculated based on the above investor classification. The dependent variable is the yield-spread. All variables are as defined in Table 1. T-statistics are reported in parentheses below each coefficient estimate, and \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

		Active Institutions	Passive Institutions	Others	Institutions with 5% or more holding	Top 5 Largest Institutions	Top 10 Largest Institutions
Variable		(1)	(2)	(3)	(4)	(5)	(6)
Intercept	+/-	3.514*** (5.62)	3.376*** (5.46)	4.862*** (6.86)	3.347*** (4.80)	3.537*** (6.56)	3.602*** (6.87)
<i>StdI</i> *100	+/-	3.224*** (8.35)	3.316*** (7.19)	0.275 (1.23)	0.005 (0.32)	0.097** (2.04)	0.151* (1.94)
<i>Prop</i> /100	+/-	-1.841*** (-3.16)	-1.376** (-2.22)	-0.891 (-0.99)	0.407 (1.05)	-0.709 (-1.23)	-1.119* (-1.96)
Rating Residual	+	0.176*** (7.46)	0.138*** (5.19)	0.099*** (4.10)	0.094*** (3.93)	0.150*** (6.38)	0.154*** (6.45)
Maturity/100	+	0.669*** (3.63)	0.612*** (3.32)	0.458** (2.35)	0.647* (1.68)	0.485** (2.49)	0.478** (2.52)
Issue Size/100	-	-25.937*** (-9.02)	-22.626*** (-6.53)	-23.897*** (-5.65)	-10.961*** (-3.06)	-16.478*** (-4.31)	-17.561*** (-4.63)
Bond Age/100	+	2.799*** (3.56)	3.039*** (3.70)	3.052*** (3.76)	2.794* (1.94)	2.752*** (3.36)	2.743*** (3.37)
Firm Size	-	-0.083* (-1.84)	-0.158*** (-3.60)	-0.313*** (-8.15)	-0.355*** (-6.54)	-0.265*** (-8.59)	-0.253*** (-7.79)
Leverage	+	2.102*** (5.45)	2.377*** (6.31)	3.084*** (8.24)	2.920*** (6.71)	2.632*** (7.69)	2.669*** (7.95)
Volatility	+	0.090*** (4.87)	0.101*** (5.39)	0.108*** (5.22)	0.138*** (8.00)	0.110*** (7.39)	0.108*** (7.16)
Year and Industry Dummies		Yes	Yes	Yes	Yes	Yes	Yes
No. of obs		12581	12581	12581	6230	12698	12698
Adj. R-Sq		0.6006	0.5914	0.5747	0.5961	0.6006	0.6010

**Table 7****Institutional Ownership Stability, Information Asymmetry, and Bond Yield-Spread**

This table reports the results of regressions explaining bond yield-spread conditional on the extent of information asymmetry and agency costs. The regressions in columns (1-3) include interactive terms between *StdI (Prop)* and a dummy variable, High-Info-Asym that equals one for the subgroup with higher information asymmetry (smaller firm size, lower analyst coverage, and higher residual volatility), and zero otherwise. Columns (4-6) report results from regressions of bond yield-spread on *StdI* conditional on agency cost of debt or agency cost of equity. In column (4), High Agency represents a dummy variable that equals one for firms with long-term debt ratio (long-term debt/market value of total assets) greater than the sample median in a specific year, and zero otherwise. In column (5), High Agency represents a dummy that equals one for firms with G-index larger than the sample median in a specific year, and zero otherwise. In column (6), High Agency represents a dummy that equals one for firms with insider ownership between 5% and 25% in a specific year, and zero otherwise. T-statistics are reported in parentheses below each coefficient estimate, and \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable		High Information Asymmetry Measures			High Agency Cost Measures		
		Small Firm Size	Low Analyst Coverage	High Residual Volatility	Large long-term Debt Ratio	Large G-index	Insider Ownership 5% to 25%
		(1)	(2)	(3)	(4)	(5)	(6)
Intercept	+/-	1.926** (2.26)	3.328*** (4.76)	3.451*** (4.80)	3.098*** (5.33)	1.766 (1.37)	1.258 (1.64)
High InfoAsym or High Agency	+	0.381 (1.18)	-0.418* (-1.72)	-0.275 (-1.02)	-0.447 (-1.52)	0.190 (0.49)	0.156 (0.53)
<i>StdI</i> *100	+/-	-4.294** (-2.28)	-1.984* (-1.92)	1.485** (2.03)	3.563*** (9.49)	1.785 (0.96)	4.519*** (4.83)
<i>StdI</i> *100*High InfoAsym or Agency	+/-	8.348*** (4.44)	6.834*** (6.52)	2.653*** (3.87)	1.769*** (4.71)	4.666*** (3.13)	2.740*** (2.69)
<i>Prop</i> /100	+/-	-0.276 (-0.47)	-1.173*** (-2.65)	-1.678*** (-5.41)	-2.571*** (-10.59)	-1.413** (-2.14)	-0.812*** (-3.37)
( <i>Prop</i> *High InfoAsym or Agency)/100	+/-	-2.058*** (-3.43)	-1.205*** (-3.15)	-0.188 (-0.39)	1.215* (1.81)	-1.229* (-1.66)	-0.489 (-0.96)
Rating Residual	+	0.215*** (8.83)	0.215*** (7.01)	0.222*** (8.03)	0.252*** (10.02)	0.214*** (6.11)	0.233*** (8.18)
Maturity/100	+	0.849*** (4.47)	0.763*** (3.76)	0.710*** (4.02)	0.715*** (4.26)	1.173*** (3.92)	0.762*** (4.89)
Issue Size/100	-	-18.699*** (-4.49)	-21.011*** (-8.13)	25.866*** (-9.12)	-23.705*** (-7.82)	-16.678*** (-4.16)	-10.701** (-1.95)
Bond Age/100	+	2.844*** (3.62)	3.664*** (3.93)	2.545*** (3.22)	3.022*** (3.77)	3.914*** (4.15)	5.964*** (6.27)
Firm Size	-	-0.029 (-0.64)	-0.075 (-1.35)	-0.024 (-0.47)	0.090** (2.07)	0.022 (0.24)	0.020 (0.48)
Leverage	+	1.594*** (4.62)	1.836*** (4.44)	1.736*** (4.32)		1.501*** (2.71)	0.237 (0.67)
Volatility	+	0.095*** (8.79)	0.071*** (3.74)	0.086*** (4.77)	0.095*** (6.68)	0.155*** (5.78)	0.060*** (3.63)
Year and Industry Dummies		Yes	Yes	Yes	Yes	Yes	Yes
No. of obs		12698	10752	12698	12708	3776	3581
Adj. R-Sq		0.6374	0.5967	0.6213	0.6172	0.6131	0.5902

## Appendix

**Table A1. Pearson Correlation Coefficients among Institutional Ownership, Bond-Specific and Firm Characteristic Variables**

	<i>StdI</i>	<i>Prop.</i>	<i>IOP</i>	Moody Rating	S&P Rating	Yield-Spread	Maturity	Bond Age	Issue Size	Firm Size	leverage
<i>Prop.</i>	-0.228 <.0001	1									
<i>IOP</i>	-0.404 <.0001	0.322 <.0001	1								
Moody rating	0.514 <.0001	-0.443 <.0001	-0.388 <.0001	1							
S&P rating	0.508 <.0001	-0.431 <.0001	-0.367 <.0001	0.982 <.0001	1						
Yield-Spread	0.449 <.0001	-0.309 <.0001	-0.257 <.0001	0.641 <.0001	0.637 <.0001	1					
Maturity	-0.077 <.0001	-0.097 <.0001	0.151 <.0001	0.143 <.0001	0.145 <.0001	0.031 0.0004	1				
Bond Age	-0.049 <.0001	-0.043 <.0001	0.143 <.0001	0.107 <.0001	0.112 <.0001	0.131 <.0001	0.349 <.0001	1			
Issue Size	-0.090 <.0001	-0.165 <.0001	-0.055 <.0001	-0.037 <.0001	-0.035 <.0001	-0.122 <.0001	-0.007 0.3832	-0.126 <.0001	1		
Firm Size	-0.549 <.0001	0.500 <.0001	0.346 <.0001	-0.774 <.0001	-0.767 <.0001	-0.505 <.0001	-0.187 <.0001	-0.075 <.0001	0.101 <.0001	1	
Leverage	0.077 <.0001	0.215 <.0001	-0.164 <.0001	-0.236 <.0001	-0.246 <.0001	0.071 <.0001	-0.340 <.0001	-0.086 <.0001	-0.074 <.0001	0.474 <.0001	1
Stock Volatility	0.338 <.0001	-0.295 <.0001	-0.396 <.0001	0.384 <.0001	0.375 <.0001	0.501 <.0001	-0.146 <.0001	-0.050 <.0001	0.119 <.0001	-0.321 <.0001	0.135 <.0001

**Table A2. Ordered Probit Models Explaining Bond Rating**

This table reports the results of ordered probit regressions explaining Moody's rating variable. All variables are as defined in Table 1. We include in all the regressions calendar year and 2-digit SIC coded industry dummy variables, and standard errors are clustered at firm level. T-statistics are reported in parentheses. \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Sign	(1)	(2)	(3)	(4)
<i>StdI</i> *100	+/-	1.644*** (3.39)		1.777*** (3.58)	2.083*** (4.23)
<i>Prop</i> /100	+/-	-0.232 (-0.93)		-0.150 (-0.58)	-0.450** (-1.93)
<i>IOP</i>	+/-		-0.506*** (-2.95)		
Firm Size	-	-0.587*** (-7.98)	-0.625*** (-9.33)	-0.494*** (-7.35)	-0.520*** (-7.40)
Leverage	+	3.758*** (11.24)	3.858*** (11.81)	3.607*** (10.42)	3.689*** (10.79)
Volatility	+	0.083*** (4.04)	0.076*** (3.53)	0.084*** (4.02)	0.065*** (2.66)
S&P 500 Dummy	-			-0.818*** (-3.64)	
ROA/100	-				
Duration/100	+				
Interest Coverage Ratio					-0.012* (-1.75)
Year and Industry Dummies		Yes	Yes	Yes	Yes
No. of obs.		13634	13634	13621	11644
Log Pseudo Likelihood		-22913.35	-22823.77	-22369.00	-17561.94
Pseudo R-Sq		0.3303	0.3329	0.3452	0.3902

**Table A3. Institutional Ownership Stability (*StdI*) Computed Over Alternative Sample Periods**

This table reports the results of the OLS regression of bond yield-spread on institutional ownership stability (*StdI*) that is computed over the previous 3 – 10 year period including the sample year. All variables are as defined in Table 1. We include calendar year and industry dummy variables in all the regressions. Standard errors are clustered at firm level. T-statistics are reported in parentheses below each coefficient estimate, and \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Sign	3-year	4-year	5-year	6-year	7-year	8-year	9-year	10-year
Intercept	+/-	3.467*** (5.02)	3.237*** (4.60)	3.067*** (4.28)	2.931*** (4.06)	2.765*** (3.84)	2.583*** (3.58)	2.412*** (3.30)	2.267*** (3.07)
<i>StdI</i> *100	+/-	3.439*** (8.27)	3.707*** (8.15)	3.902*** (8.07)	4.056*** (8.13)	4.261*** (8.36)	4.534*** (8.59)	4.848*** (8.69)	5.148*** (8.75)
<i>Prop</i> /100	+/-	-2.243*** (-7.07)	-2.007*** (-5.84)	0.217*** (7.90)	-1.674*** (-4.74)	-1.514*** (-4.29)	-1.363*** (-3.98)	-1.214*** (-3.74)	-1.064*** (-3.43)
Rating Residual	+	0.217*** (7.84)	0.217*** (7.86)	0.727*** (4.00)	0.217*** (7.93)	0.217*** (7.97)	0.217*** (8.04)	0.217*** (8.17)	0.217*** (8.30)
Maturity/100	+	0.730*** (3.95)	0.730*** (3.98)	-26.606*** (-9.46)	0.720*** (4.00)	0.722*** (4.05)	0.728*** (4.12)	0.738*** (4.21)	0.745*** (4.28)
Issue Size/100	-	-27.337*** (-9.73)	-27.010*** (-9.71)	2.578*** (3.26)	-26.094*** (-9.15)	-25.814*** (-8.92)	-25.830*** (-8.85)	-26.049*** (-8.83)	-26.208*** (-8.76)
Bond Age/100	+	2.620*** (3.30)	2.615*** (3.30)	0.011 (0.23)	2.580*** (3.25)	2.579*** (3.23)	2.586*** (3.23)	2.607*** (3.24)	2.628*** (3.27)
Firm Size	-	0.011 (0.23)	0.012 (0.24)	1.730*** (4.29)	0.007 (0.14)	0.008 (0.16)	0.014 (0.27)	0.022 (0.41)	0.028 (0.51)
Leverage	+	1.751*** (4.26)	1.742*** (4.28)	0.086*** (4.90)	1.720*** (4.30)	1.709*** (4.30)	1.695*** (4.28)	1.681*** (4.27)	1.668*** (4.26)
Volatility	+	0.084*** (4.57)	0.085*** (4.77)	0.217*** (7.90)	0.086*** (5.04)	0.086*** (5.11)	0.086*** (5.06)	0.086*** (4.93)	0.085*** (4.82)
Year and Industry Dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.		12682	12690	12698	12705	12710	12714	12717	12717
Adj. R-Sq		0.6178	0.6172	0.6169	0.6168	0.6169	0.6171	0.6173	0.6175

**Table A4: The Impact of Merger and Acquisition**

This table reports the results of the OLS regressions explaining bond yield-spread by including an M&A dummy and its interaction term with the ownership stability measures. We delete the institutions involved in any mergers during our sample period (4.7% of all institutions). The M&A dummy variable equals one for firms involved in a merger during the year of the merger and the subsequent four years, and zero otherwise. We include calendar year and industry dummy variables in the regressions. Standard errors are clustered at firm level. T-statistics are reported in parentheses below each coefficient estimate, and \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable		(1)	(2)
Intercept	+/-	3.045*** (4.29)	2.841*** (5.42)
M&A dummy	+/-	0.162 (1.04)	-0.208 (-1.07)
StdI*100	+/-	3.960*** (7.55)	
StdI*100*M&A dummy	+/-	-0.376 (-1.27)	
IOP	+/-		-0.536*** (-2.92)
IOP*M&A dummy	+/-		0.287 (1.52)
Prop/100	+/-	-1.860*** (-4.14)	
(Prop*M&A dummy)/100	+/-	-0.113 (-0.40)	
Rating Residual	+	0.217*** (8.01)	0.238*** (7.65)
Maturity/100	+	0.727*** (4.04)	0.685*** (3.65)
Issue Size/100	-	-26.430*** (-9.55)	-20.401*** (-7.11)
Bond Age/100	+	2.625*** (3.37)	2.226*** (2.86)
Firm Size	-	0.002 (0.03)	-0.100*** (-2.63)
Leverage	+	1.761*** (4.38)	1.901*** (4.81)
Volatility	+	0.086*** (4.87)	0.091*** (5.72)
Year and Industry Dummies		Yes	Yes
No. of obs		12698	12698
Adj. R-Sq		0.6171	0.6277

**Table A5. Alternative Control Variables**

This table reports results from the ordered probit regression explaining Moody's rating in columns (1)-(5) and the OLS regression explaining bond yield-spread in columns (6)-(10). In these models, we include several new control variables: (a) EBITDA/interest: defined as the ratio of operating income before depreciation to interest expenses; (b) EBITDA/fixed cover: defined as the ratio of operating income before depreciation to interest expenses on long-term debt; (c) FFO (Funds from Operations)/debt: defined as the ratio of FFO (net income +depreciation and amortization – gains on sales of property) to total debt; (d) Debt/EBITDA: defined as the ratio of total debt to operating income before depreciation; (e) Interest Bearing Debt/EBITDA: defined as the ratio of total debt minus trade debt to operation income before depreciation. All other variables are as defined in Table 1. We include calendar year and industry dummy variables in all the regressions. Standard errors are clustered at firm level. T-statistics are in parentheses. \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Sign	Moody's Rating (ordered probit model)					Yield-Spread (OLS model)				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	+/-	/	/	/	/	/	3.569*** (3.89)	5.372*** (4.57)	1.648** (2.29)	3.167*** (3.57)	3.171*** (3.62)
StdI *100	+/-	1.171** (2.01)	4.814** (1.93)	1.842*** (2.83)	1.527*** (2.56)	1.146** (2.05)	3.502*** (5.37)	2.883*** (4.64)	4.455*** (9.94)	3.677*** (6.71)	3.714*** (6.25)
Prop/100	+/-	-0.298*** (-2.89)	-0.467 (-0.61)	-0.366 (-1.41)	-0.295 (-1.05)	-0.382 (-1.31)	-1.625*** (-4.02)	-1.547*** (-3.21)	-1.894*** (-5.60)	-1.665*** (-4.42)	-1.682*** (-4.58)
Rating Residual	+						0.216*** (5.65)	0.236*** (6.31)	0.267*** (10.88)	0.227*** (7.10)	0.229*** (6.58)
Maturity/100	+						0.454* (1.74)	0.558 (1.30)	0.674*** (3.22)	0.474** (2.06)	0.482* (1.97)
Issue Size/100	-						-25.933*** (-7.49)	-27.001*** (-3.32)	-20.314*** (-8.10)	-25.063*** (-7.56)	-25.575*** (-8.29)
Bond Age/100	+						3.344*** (3.74)	4.946*** (3.57)	2.427** (2.56)	3.260*** (3.73)	3.228*** (3.70)
Firm Size	-	-0.602*** (-6.44)	-0.160 (-0.70)	-0.560*** (-5.96)	-0.569*** (-6.26)	-0.616*** (-6.95)	-0.038 (-0.60)	-0.240** (-2.42)	0.065 (1.20)	-0.020 (-0.35)	-0.018 (-0.30)
Leverage	+	3.813*** (9.52)	3.485*** (3.36)	3.881*** (9.67)	3.757*** (10.32)	3.734*** (9.74)	2.023*** (4.05)	2.242*** (2.91)	1.888*** (4.23)	2.023*** (4.25)	2.014*** (4.24)
Volatility	+	0.101*** (7.81)	0.153*** (5.98)	0.076*** (2.73)	0.076*** (3.20)	0.099*** (7.51)	0.071*** (3.75)	0.103*** (4.09)	0.078*** (3.66)	0.074*** (4.45)	0.073*** (4.00)
(EBITDA/Interest)/100	-	-0.103** (-2.05)					0.046 (1.22)				
EBITDA/Fixed Coverage	-		0.003 (0.66)					0.003 (1.43)			
FFO/Debt	-			-0.022** (-2.09)					-0.003 (-0.56)		
(Debt/EBITDA)/1000	+				-0.005 (-0.33)					-0.014 (-0.79)	
(Interest Bearing Debt)/(EBITDA*1000)	+					0.037*** (9.66)					-0.002 (-0.44)
Year and Industry Dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.		10055	1220	9738	10691	10691	9390	1161	9072	9991	10153
Log Pseudo Likelihood		-15178.95	-2071.58	-14105.81	-16642.47	-16353.47					
Pseudo R-Sq or Adj. R-Sq		0.3636	0.2954	0.3899	0.3496	0.3609	0.6141	0.7625	0.6289	0.6199	0.6198

**Table A6: Industry Average Insider Ownership as a Proxy for Agency Cost of Equity**

This table reports the results of the OLS regressions explaining bond yield-spread conditional on the extent of industry average insider ownership. High Agency cost of Equity Dummy is equal to 1 for bond observations belonging to a 3-digit SIC coded industry in which the average insider ownership is between 5% and 25% in a specific year, and zero otherwise. The dependent variable is the yield-spread. All other variables are as defined in Table 1. We include calendar year and industry dummy variables in all the regressions. Standard errors are clustered at firm level. T-statistics are reported in parentheses below each coefficient estimate, and \*, \*\*, and \*\*\* indicates statistical significance at the 10%, 5% and 1% level, respectively.

Variable		(1)
Intercept	+/-	2.043 (2.67)
High Agency	+	-0.210 (-0.94)
StdI*100	+/-	3.210*** (3.51)
StdI*100*High Agency Cost of Equity	+/-	1.847* (1.85)
Prop/100	+/-	-2.302*** (-6.40)
(Prop*High Agency Cost of Equity)/100	+/-	0.598 (1.48)
Rating Residual	+	0.242*** (8.76)
Maturity/100	+	0.768*** (4.94)
Issue Size/100	-	-11.369** (-2.10)
Bond Age/100	+	6.002*** (6.28)
Firm Size	-	0.018 (0.43)
Leverage	+	0.190 (0.53)
Volatility	+	0.060*** (3.43)
Year and Industry Dummies		Yes
No. of obs		3581
Adj. R-Sq		0.5871