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# Institutional ownership and credit spreads: An information asymmetry perspective☆

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ABSTRACT

Recent literature has documented a link between institutional equity ownership (*IO*) and cost of debt capital, and interpreted it as a corporate governance effect. However, institutional equity investors may also affect cost of debt through their influence on information asymmetry condition of firms. To distinguish between the two effects, we break down institutional investors into different groups: transient institutional investors (*TRA* who are sensitive to information asymmetry but unlikely to participate in corporate governance, and the dedicated ones (*DED*) who act oppositely. Based on a most up-to-date and comprehensive bond data spanning the past 20 years, we find that credit spreads narrow (widen) with an increase in equity ownership by *TRA* (*DED*). The effects are most prominent among short-term bonds, bonds with lower ratings, higher leverage and higher volatilities. The results persist after controlling for potential endogeneity and other information asymmetry measures, and are unlikely due to an asset substitution effect. Overall, our findings provide strong support for the effect of information asymmetry on credit spread, and highlight the importance of distinguishing various types of institutional investors.



## 1. Introduction

Recent literature has examined whether firms attracting more institutional investors on the equity side also tend to have lower cost of debt capital. For example, Ashbaugh, Collins, and LaFond (2006) and Bhojraj and Sengupta (2003) find the higher the *total* institutional equity ownership (*IO*), the better credit ratings and narrower credit spreads. They attribute these findings to stronger incentives and better skills of institutional investor to monitor management, thereby enhancing corporate governance and reducing cost of debt.

However, given potential wealth transfer between equity and debt holders, it is not clear whether improved corporate governance necessarily reduces the cost of debt. Furthermore, there is ample evidence questioning whether most institutional investors are in the business of monitoring. For instance, Chen, Harford, and Li (2007) show that in mergers and acquisitions, only independent institutions with long-term investments specialize in monitoring, while others do not. Hendry et al. (2006) interview senior managers from institutional investors and large corporations and find that the monitoring role by institutional investors is rather limited. These studies, taken together, raise the question: is there an alternative explanation other than corporate governance for the link between *IO* and cost of debt?

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Motivated by recent work which suggest that increasing information risk and worsening informational asymmetry lead to wider credit spreads,[1] this paper proposes a plausible alternative explanation based on information asymmetry. Over the investing and trading process, institutional investors are likely to consider information asymmetry aspect of firms. Their presence may further impact the informational asymmetry condition. For instance, institutional investors engaging in active monitoring may gain informational advantage through the process, hence exacerbating information asymmetry and adverse selection cost. Yet, other institutions engaging in active trading rather than monitoring tend to expedite information revealing and therefore alleviate information asymmetry. By examining the effect of institutional investors on information asymmetry and hence on cost of debt, this paper complements the prior literature that focuses on a traditional corporate governance effect.

Due to the strong heterogeneity among institutional investors, the effects by different types of *IO* on information asymmetry may be offsetting. Hence, it is not clear a priori how the *total IO* is related to information asymmetry, and therefore, to cost of debt. To address this issue, we adopt a decomposition algorithm developed by Bushee (1998, 2001).[2] Institutions are categorized into three groups based on their past investment and trading styles: the transient group with high turnover and highly diversified positions (*TRA*); the quasi-indexing group with low turnover and high diversification (*QIX*); and the dedicated group with low turnover and high concentration in their investment (*DED*).

This decomposition algorithm provides an ideal opportunity to distinguish the information asymmetry effect from the traditional corporate governance effect. First, the short-term holding horizon and the diversified positions prevent *TRA* from being actively involved in the monitoring process, therefore their presence is unlikely to lead to enhanced corporate governance. However, from information asymmetry perspective, with a high portfolio turnover, *TRA* is expected to be sensitive to stock liquidity and therefore, to concentrate on stocks with tight bid-ask spreads and low adverse selection costs. Hence, high *TRA* ownership is likely to indicate less information asymmetry in a firm.

On the other hand, the *DED* group is expected to help improve corporate governance the most due to their long-term investment nature and their concentrated stakes. Yet, this group is also likely to be associated with higher information asymmetry cost, because (1)they have substantial research resources to cover just a small number of firms, so they will not be deterred to invest in less transparent firms; and (2) their monitoring role in corporate governance may further give *DED* an informational advantage. An example of *DED* investors is Warren Buffet's Berkshire Hathaway. Institutions in this group are willing to trade in stocks with greater spreads because they have better information and consequently, are likely to be associated with firms with greater information asymmetry.

Under the information asymmetry hypothesis, we would expect bonds issued by firms with more *TRA* (*DED*) investors tend to have lower (wider) spreads. Under the corporate governance hypothesis, we would then expect a strong impact on spread from the *DED* investors who are most likely to monitor, yet no significant impact on spread from the *TRA* investors who presumably offer no monitoring.

Combining the Fixed Income Securities Database described by Warga (1998) (FISD), the National Insurance Commissioners (NAIC), and the TRACE bond data, in this study, we construct a most up-to-date and comprehensive data set for credit spread analysis from 1986 to 2005. We document a strongly heterogeneous pattern in the relation between the equity holdings by various institutional groups and informational asymmetry condition of firms. Firms with more *TRA* investors are found to have a lower probability of informed trading, narrower bid-ask spreads, lower analyst forecast dispersions, better accounting disclosure qualities, and more liquid equity and bond, while the opposite holds for firms attracting more *DED* investors. Such distinct patterns for *TRA* and *DED* investors suggest that lumping their equity holdings together may wash out the effects of the two extreme groups on information asymmetry. This may explain mixed evidence on the relation between *total IO* and information asymmetry in the past research.

Our main results concern the relation between different *IO* groups and credit spreads. We find that credit spreads narrow (widen) with an increase in equity holdings by institutional groups that are more (less) sensitive to information asymmetry and least (most) likely to monitor. One standard deviation increase in *TRA* is associated with a *reduction* in spreads by $0.83 \times 10.29 = 8.54$ bp, whereas a one standard deviation increase in *DED* is associated with an *increase* of $0.34 \times 9.25 = 3.15$ bp in spreads.[3] We further find that such effects are most prominent in the subsamples of short-term bonds, bonds with lower ratings, higher leverage and higher volatilities, where information asymmetry risk premium is expected to be higher. Our results are not subsumed after controlling for other information asymmetry measures suggested by the prior literature. Overall, our results are in supportive of the information asymmetry hypothesis: bondholders demand wider credit spreads, when there is more information asymmetry as reflected by lower *TRA* and higher *DED*.

In addition, we rule out an equity chasing explanation which suggests that the *TRA* (*DED*) pursues specific equity styles, and bonds issued by firms with these styles tend to have low (high) spreads. Specifically, we divide the sample according to the issuing firm's equity style. Within each group of bonds sharing the same equity style, we find that the distinct effect of *TRA* and *DED* on credit spreads persists.

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[1] See Duffie and Lando (2001) and Cetin, Jarrow, Protter, and Yildirim (2004).

[2] Although Thomson Financial provides an alternative classification approach, grouping institutional investors into banks, insurance companies, investment companies, and independent investment advisors, such classification results are erroneous from 1998 and beyond, due to a mapping error when Thomson Financial integrated data from the former Technimetrics, as stated in the data manual.

[3] Bhojraj and Sengupta (2003) find a positive effect of blockholder on spreads. However, our finding of a positive effect of *DED* on spreads is different from this "blockholder" effect, since *DED* and *Block* are defined differently. On average, *Block* accounts for 8% equity holdings, while *DED* for over 14% in a matched sample as in Bhojraj and Sengupta (2003). Moreover, for a number of firms in our data, *TRA* and *QIX* are blockholders, while *DED* are non-blockholders.

Moreover, we examine whether an asset substitution effect could drive our results. If under the pressure of the proactive *DED* investors, managers are more likely to adopt risky projects to the detriment of debtholders, we would also expect a positive effect of *DED* on credit spread. To distinguish it from the information asymmetry effect, we focus on the impact on credit spread due to the interaction effect between the *DED* ownership and measures of "likelihood" for asset substitution. We find that when there is more room for asset substitution, *DED* investors actually help *reduce* credit spread, inconsistent with the asset substitution hypothesis.

Finally, we address the potential endogeneity issue that such distinct patterns may arise because *TRA* (*DED*) prefers firms with lower (higher) credit spreads. Using a simultaneous equations approach which allows institutional ownership to influence credit spread and also to be influenced by credit spread, we find that although both TRA and *DED* investors tend to be attracted to firms with higher credit spread, their presence, on the other hand, has different impact on credit spread: credit spread narrows by 2.46 bp for a 1% increase in *TRA*, while it widens by 3.21 bp for a 1% increase in *DED*.

Several papers have provided evidence that information risk and information asymmetry affect credit spreads.[4] For example, Sengupta (1998), Yu (2005), Mansi, Maxwell, and Miller (2005), and Odders-White and Ready (2006) relate credit rating and credit spread to information asymmetry proxies, including accounting disclosure score, analyst forecast dispersion, and stock bid-ask spreads. Our paper contributes to this literature by providing a new way of capturing information asymmetry based on various types of *IO*s, and the economic impact of our measures on credit spread compares favorably with variables in the previous studies. In addition, using a most comprehensive data in the credit spread studies, we contribute to the literature by confirming that the effect of information asymmetry on credit spread is robust to changes in macroeconomic conditions and to the evolution of bond market over the past 20 years.

The remainder of the paper is organized as follows. Section 2 examines how equity holdings by various institutional groups are related to information asymmetry measures. Section 3 introduces the data set. Section 4 presents the main findings on the relation between credit spreads and distinct institutional equity holdings. Section 5 concludes.

## 2. Institutional equity holdings and information asymmetry

In this section, we discuss how equity holdings by institutions with distinct investment and trading styles are associated with the informational characteristics of firms they hold.

The empirical evidence on the link between institutional equity ownership and information asymmetry has been mixed.[5] The contrasting findings are, in part, due to the use of *total IO*. Institutional investors are not a homogeneous group. For example, Bushee and Goodman (2007) find that informed trading is prevalent only for institutions with large stakes. Consequently, some institutions may concentrate on firms with high information asymmetry, while others may avoid such firms. Thus a breakdown of institutional equity holdings by group will shed further light on information asymmetry of firms.

In our analysis, we adopt a decomposition algorithm developed by Bushee (1998, 2001).[6] First, the extent of portfolio diversification for each institution is measured by level of portfolio concentration, average percentage holding, fraction of institutional block holdings (defined as owning more than 5% of all shares outstanding), and a Herfindahl measure using the squared percentage ownership in each firm. Secondly, trading frequency is measured by portfolio turnover, and by a stability measure based on the fraction of equity held for more than 2 years. Based on these six measures, a principal component analysis is performed to extract two common factors: BLOCK and PTURN. A low (high) BLOCK indicates a diversified (concentrated) investment position, while a low (high) PTURN indicates a low (high) trading frequency for the institution. Finally, a cluster analysis is performed to obtain the final separation of firms into three groups: (1) the transient group (*TRA*) with high turnover and highly diversified positions; (2) the quasi-indexing group (*QIX*) with low turnover and high diversification; and finally (3) the dedicated group (*DED*) with low turnover and high concentration in their investment.

The *TRA* investors, due to their frequent trading needs, are expected to be attracted to firms with smaller bid-ask spreads and less information asymmetry. However, the *DED* investors, due to their long-term investment style and superior information they may possess, are expected to buy stocks of firms with greater information asymmetries. Finally, while on average, *QIX* investors follow indexing strategies, some institutions in this category, such as CalPERS, are active managers taking a proactive approach shaking up corporate management, which may result in informational advantage. Hence the relation between *QIX* equity holdings and information asymmetry cost is not clear.

Our sample includes 19,154 firm-quarter observations over the period of 1986Q1 to 2005Q4. To investigate how information asymmetry is related to equity holdings by various groups of institutional investors, we estimate the following equation using the panel regression adjusted for firm clustering effect and time and industry fixed effects

$$IA_{i,t} = c_0 + c_1 IO_{i,t} + c_2 \mathrm{Vol}_{i,t} + c_3 ESize_{i,t} + c_4 \mathrm{Turn}_{i,t} + c_5 \#A_{i,t} + e_{i,t}. \tag{1}$$

Information asymmetry measures (*IA*) considered include: probability of informed trading following Easley, O'Hara, and Hvidkjaer (2002) (*PIN*); bid-ask spread scaled by the middle price (*BA*); analyst forecast dispersion (*DISP*); accounting disclosure quality score issued by the Association for Investment and Management Research (*DISC*); illiquidity measures for equity and bond as the average daily ratio of absolute return over dollar trading volume following Amihud (2002) (*AmihudEquity* and *AmihudBond*,

[4] Important papers examining the determinants of corporate yield spreads include Collin-Dufresne, Goldstein, and Helwege (2003), Collin-Dufresne, Goldstein, and Martin (2001), Eom, Helwege, and Huang (2004), Longstaff and Schwartz (1995), Longstaff, Mithal and Neis (2005), and many others.

[5] See Jennings, Schnatterly and Seguin (2002), Jiang and Kim (2005) and Dennis and Weston (2001) please.

[6] We thank Brian Bushee for sharing the classification results.

**Table 1**
Institutional equity holdings and information asymmetry measures.

| Model | *PIN* | | *BA* | | *DISP* | | *DISC* | | *AmihudEquity* | | *AmihudBond* | | $\gamma$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| *IO* | −0.03 | | −0.54 | | 0.02 | | 0.25 | | −0.02 | | 0.00 | | 0.00 | |
| *t*-stat | −2.91 | | −5.97 | | 1.74 | | 1.87 | | −5.38 | | −0.57 | | 0.63 | |
| *TRA* | | −0.03 | | −0.55 | | −0.02 | | 0.09 | | −0.02 | | −0.02 | | −0.01 |
| | | −2.25 | | −5.88 | | −2.01 | | 0.35 | | −3.49 | | −2.61 | | −1.72 |
| *QIX* | | −0.05 | | −0.89 | | 0.01 | | 0.56 | | −0.04 | | 0.00 | | 0.00 |
| | | −5.05 | | −6.71 | | 0.87 | | 3.10 | | −6.42 | | −0.64 | | 0.75 |
| *DED* | | 0.02 | | 0.31 | | 0.08 | | −0.34 | | 0.00 | | 0.05 | | 0.02 |
| | | 1.76 | | 2.42 | | 3.43 | | −1.25 | | 0.42 | | 2.75 | | 1.94 |
| Vol | 0.09 | 0.07 | 3.62 | 3.32 | −0.09 | −0.10 | 0.69 | 0.81 | 0.22 | 0.22 | −0.16 | −0.16 | −0.01 | −0.01 |
| | 2.52 | 2.23 | 8.83 | 8.09 | −1.56 | −1.70 | 2.42 | 2.88 | 13.22 | 12.94 | −4.53 | −4.62 | −0.38 | −0.42 |
| *Esize* | −0.08 | −0.08 | −0.33 | −0.31 | 0.00 | 0.00 | 0.12 | 0.04 | −0.07 | −0.07 | −0.01 | −0.01 | 0.00 | 0.00 |
| | −7.06 | −6.99 | −6.62 | −6.41 | 0.50 | 0.52 | 0.51 | 0.18 | −6.01 | −6.02 | −3.17 | −2.92 | −3.14 | −2.99 |
| Turn | 0.01 | 0.01 | −0.65 | −0.59 | 0.20 | 0.21 | −1.04 | −1.02 | −0.08 | −0.08 | 0.00 | 0.00 | 0.01 | 0.01 |
| | 0.82 | 0.86 | −5.28 | −4.68 | 7.65 | 7.88 | −3.56 | −3.25 | −10.97 | −11.13 | −0.30 | 0.20 | 1.80 | 2.19 |
| *#A* | −0.16 | −0.16 | −1.41 | −1.33 | 0.01 | 0.01 | 1.23 | 1.30 | −0.10 | −0.10 | 0.02 | 0.02 | 0.00 | 0.00 |
| | −7.87 | −8.11 | −10.69 | −10.88 | 0.43 | 0.27 | 2.95 | 3.11 | −8.77 | −8.90 | 1.22 | 0.81 | 0.54 | 0.08 |
| Adj. $R^2$ (%) | 29.99 | 31.15 | 21.16 | 22.73 | 16.62 | 17.05 | 5.48 | 7.64 | 25.52 | 26.24 | 5.42 | 6.37 | 6.05 | 6.57 |
| #Firm-quarter obs. | 9313 | | 12205 | | 14800 | | 2337 | | 12024 | | 2430 | | 2614 | |
| #Clusters | 705 | | 903 | | 965 | | 200 | | 813 | | 450 | | 459 | |

This table reports the panel regression results at the firm level on the relation between institutional equity holdings and information asymmetry measures, *IA*:

$$IA_{i,t} = c_0 + c_1 IO_{i,t} + c_2 \mathrm{Vol}_{i,t} + c_3 ESize_{i,t} + c_4 \mathrm{Turn}_{i,t} + c_5 \#\mathrm{Analysts}_{i,t} + e_{i,t}.$$

The sample period is from 1986Q1 to 2005Q4. *IO*, *TRA*, *QIX* and *DED* are the percentages of stocks owned by institutional investors and by the transient, quasi-indexing, and dedicated subgroups. *IA* considered include: *PIN*, probability of informed trading following Easley, O'Hara and Hvidkjaer (2002), in %; *BA*, stock daily average bid-ask spread scaled by middle prices, in bp; *DISP*, analyst forecast dispersion, in %; *DISC*, accounting disclosure quality issued by AIMR; *AmihudEquity* and *AmihudBond*, illiquidity measures for equity and bonds as the average daily ratio of absolute return to dollar trading volume, respectively; and $\gamma$, a bond illiquidity measure based on the negative covariance of consecutive price changes following Bao, Pan, and Wang (2008). Other control variables included are: *Vol*, stock returns volatility as the standard deviation of the daily stock returns over the prevailing quarter, in %; *ESize*, market capitalization of equities in billion$; *Turn*, average daily turnover of stocks over the prevailing quarter, quoted in %; and *#A*, number of outstanding analyst forecasts for each quarter. *t*-statistics reported immediately underneath are corrected for firm clustering effect and time and industry fixed effects.

respectively); and a bond illiquidity measure based on the negative covariance of consecutive price changes following Bao, Pan, and Wang (2008) ($\gamma$). *IO* and its subgroups are the percentages of shares held by institutional investors out of all shares outstanding. Firm characteristics including stock returns volatility, market capitalization of equities, average daily turnover of stocks, and number of outstanding analyst forecasts, are added as control variables. Alternatively, we estimate Eq. (1) using Fama–MacBeth analysis: first we conduct cross-sectional regressions for each quarter, and then construct time series mean and *t*-statistics adjusted for heteroscedasticity and autocorrelation. The results are similar, so we omit them for brevity.

As seen in Table 1, for *PIN*, Model 1 indicates a highly significant negative relation between the total *IO* and the probability of informed trading. Model 2, however, shows that the relationship is considerably more complex. While *PIN* is negatively associated with *TRA* ownership, it is positively associated with *DED* ownership. The results are similar when *BA*, *DISP*, *AmihudEquity*, *AmihudBond*, and $\gamma$ are used to measure information asymmetry. The results based on *DISC* are consistent with other measures, albeit less significant.

Given the different effects of *TRA* and *DED* on information asymmetry of firms, the next question to address is whether equity holdings by these groups provide incremental information for credit spreads. We hypothesize that larger holdings by the *TRA* group, reflecting less information asymmetry, will be associated with narrower credit spreads, and that higher holdings by the *DED* group will be associated with wider spreads.

## 3. Data

### 3.1. Data description

In this paper, three major sets of data are employed to measure corporate bond prices and characteristics, firm characteristics, and institutional equity holdings.

To ensure a most up-to-date and comprehensive data coverage, we construct the bond data by combining the Fixed Income Securities Database described by Warga (1998) (FISD), the National Insurance Commissioners (NAIC), and the TRACE bond data. The FISD database covers the period from 1986 until 1998. The NAIC database consists of detailed information on all transactions by life insurance companies, property and casualty insurance companies, and Health Maintenance Organizations (HMOs) from 1999 to 2002.[7] Finally, for the period from 2003 to 2005, we utilize recently accessible TRACE dataset, which provides the issue cusip, the

[7] Although the holdings by insurance companies account for 30% of all outstanding corporate bonds, these positions are representative of the overall corporate bond market. Hence, according to Theocharides (2006) and Chakravarty and Sarkar (2003), using such data does not systematically bias the results.

date and time of bond trading, the price, and the yield, and then merge it with bond characteristics contained in the FISD. Following Edwards, Harris, and Piwowar (2006), we exclude all trades less than $100,000, as they are considered to be retail transactions. Following Bessembinder, Maxwell, and Venkataraman (2006), we calculate the mid-point of all trades during the day to reflect that day's closing price. The merged dataset contains quarter-end price, accrued interest, coupon rate, yield to maturity, and descriptive data such as rating, option features, issuance and maturity date from 1986 to 2005.

Our main variable, credit spread, is computed as the difference between a corporate bond yield and a duration-equivalent US Treasury bond yield, quoted in basis point (bp). The advantage of duration-matching over maturity-matching is that it effectively transforms bonds into their equivalent zero-coupon securities so that the coupon effect is eliminated. The treasury bond yields are the constant-maturity treasury rates obtained from the Federal Reserve Bank of St. Louis. If no duration-equivalent treasury bond is available, we use the Nelson and Siegel (1987) method to calculate an interpolated yield.[8]

Important debt characteristics considered include duration, convexity, and rating. *Duration*, which represents the effective maturity of a bond, taking into consideration the timing of all promised cash flows, is constructed as:

$$\text{Duration} = \sum_{t=1}^{T} \frac{t \times CF_t}{P(1+y)^t}$$

where $CF_t$ is the security cash flows at time $t$, $t$ is the number of periods until the cash flow, $P$ is the security price, $y$ is the yield to maturity, and $T$ is the total number of cash flows.

Convexity captures the degree of curvature along which bond price changes in response to interest rate changes. For a bond with notional value of $M$, it is constructed as follows:

$$\text{Convexity} = \sum_{t=1}^{T} \frac{t(t+1)CF_t}{(1+y)^{t+2}} + \frac{T(T+1)M}{(1+y)^{T+2}P}.$$

Credit ratings are measured by Moody's numeric grades: Aaa: 1,2; Aa: 3–5; A: 6–8; Baa: 9–11; Ba: 12–14; B: 15–17; and Caa: 18–20. Given that credit rating may not affect credit spread in a linear fashion, we also use rating dummies to capture the nonlinear effect. This yields similar results as using numeric ratings.

Other bond characteristics considered include the issue size as the dollar amount of bond notional value at issuance, bond age, coupon rate, and dummies indicate whether there is an embedded call option and whether a bond has covenants. For each bond in our sample, we extract the corresponding firm data from the CRSP and COMPUSTAT database.

To alleviate the potential influence due to 'stale price', we only consider observations with positive trading volume data. In particular, we consider the quarter-end market capitalization of equities (*ESize*); *Turnover* as the average daily turnover of the stock over the prevailing quarter in percentage; and *Volatility* as the standard deviation of the daily stock returns over the prevailing quarter in percentage.[9] In addition, *Leverage* is measured as the book value of total long-term debt divided by the sum of the book value of long-term debts and the market value of equity. $M/B$ is the market value of assets to book value of assets, where the market value of assets is estimated as the book value of assets minus the book value of equity plus the market value of equity.

Furthermore, we also consider asset tangibility and asset maturity measures. Following Almeida and Campello (2007), asset tangibility (*ATangibility*) is measured as the liquidation value given by $(0.715 \times Receivables + 0.547 \times Inventory + 0.535 \times Capital)$ plus cash holdings, then scaled by the total book value of assets. Following Billett et al. (2007), asset maturity (*AMaturity*) is defined as the book value-weighted maturity of long-term assets and current assets, where the maturity of long-term assets is computed as gross property, plant, and equipment divided by depreciation expense and the maturity of current assets is computed as current assets divided by the cost of goods sold.

In addition, we include the following information asymmetry measures of firms suggested by the existing studies:

*PIN*: Easley, O'Hara, and Hvidkjaer (2002) construct a measure of the probability that a trader has private information, using the number of buy and sell orders for each stock in a given period. We download the data from http://www.smith.umd.edu/faculty/hvidkjaer, and *PIN* is quoted in percentages.

*BA*: It is the average of stock bid-ask spreads scaled by the middle prices from the TAQ database within the prevailing quarter, quoted in bp.

*DISP*: For each firm in our sample, we construct the standard deviation of forecasts across analysts on earnings that will be released in 60–90 days, from the Institutional Broker Estimation System (I/B/E/S). The dispersions are quoted in percentages of a dollar.[10] We also extract the corresponding number of analyst estimates for each dispersion (*#A*). There must be at least 3 estimates in order to construct a dispersion measure. To alleviate the impact of outliers, we winsorize *DISP* at the 99% level.

[8] The use of linear interpolation to fill in the gaps introduces an influential observation problem (due to clustering) at the short end of the yield curve and large errors at the intermediate and long end of the curve due to constant forward rates at these segments. We thank an anonymous referee for pointing out this.

[9] We also considered volatility of market adjusted returns, and the results are similar.

[10] When constructing the forecast dispersion, we adopted different release windows, as well as the stock price-scaled dispersions instead of the raw ones. The results are essentially the same.

*DISC*: It is the annual ranking scores of corporate disclosure practices. Each year, the Association for Investment and Management Research (AIMR) evaluates the sample firms on a scale of 0–100, based on the timeliness, detail, and clarity of a company's public disclosures on annual and quarterly reports, proxy statements, press releases, fact books and meetings with analysts etc. The construction details follow Bushee and Noe (2000).

*AmihudEquity*: Following Amihud (2002), illiquidity of equity is measured by the average daily ratio of absolute return to trading volume in million dollars within the prevailing quarter. Equity with higher value of *AmihudEquity* is more illiquid.

*AmihudBond*: Based on the TRACE transaction data from 2003–2005, we construct *AmihudBond* in a similar way as *AmihudEquity* for each bond. For the firm level *AmihudBond*, we average over all issues in each firm using issue size as the weight.

$\gamma$: Based on the TRACE transaction data from 2003–2005, we follow Bao, Pan, and Wang (2008) and construct another bond illiquidity measure of $\gamma$ as the negative covariance of consecutive daily price changes, $\gamma = -COV(\Delta P_t, \Delta P_{t-1})$ within the prevailing quarter. The higher $\gamma$, the more illiquid a bond is. The firm level $\gamma$ is the average $\gamma$ over all bonds weighted by issue size.

Finally, data on institutional holdings are collected from the Thomson Financial Institutional Holdings (13F) database. SEC Rule 13F requires that all institutions with more than \$100 million of equity under management file a quarterly report listing all equity holdings that are greater than 10,000 shares or \$200,000 in market value. For each firm in our bond sample, we calculate the total institutional holdings (*IO*) by adding up the shares owned by all institutions filing 13F for that firm. Following Bushee's (1998, 2001) classification, we further break down the total institutional holdings for each firm into holdings by *TRA*, *QIX*, and *DED* groups. *IO*, *TRA*, *QIX*, and *DED* are scaled by the quarter-end shares outstanding, and quoted in percentages.

### 3.2. Summary statistics

Following the standard practice in the corporate bond literature, we impose the following filters for data screening. To avoid the compounding effect on the industry influence, we only consider bonds issued by non-financial and non-utility firms. To ensure the reliability of the price data, we exclude bonds with matrix-priced quotes, and with a maturity of less than 1 year or higher than 30 years. To alleviate the influence of extreme observations, we exclude negative spreads and spreads over 1000 bp.[11] Finally, we also screen the data for possible entry errors by eliminating large price reversals. In total, there are 45,830 bond-quarter observations with 4263 unique bonds in our sample.

To better understand how the sample is distributed over time and across different rating groups, we report in panel A of Table 2 the average quarterly number of bonds for four subperiods. Comparing the relative proportions of bonds across different rating groups reveals a clear rating downgrade trend in the corporate bond industry over the past 20 years. Bonds ranked at A and above accounted for about 80% of all bonds in the late 1980s, then gradually declined to less than 40% in the past 10 years, while the fraction of junk bonds increased from 0 to more than 20% over this period.

Panel B of Table 2 provides the summary statistics. The average yield spread is 179 bp, varying from less than 1 bp to over 900 bp. The institutional investors on average hold about 58% of equities in this sample, with about 14% by *TRA*, 34% by *QIX*, and 10% by *DED*. The "average" bond in our sample is 3.59 years old, with an issue size of \$280 M, a duration of over 6 years, coupon rate of over 7%, a rating of 9.14. 26% of bonds have an embedded option and 81% of them contain covenants. The average market capitalization is over \$11 billion, with the median equity size above \$1 billion, suggesting that the sample consists mostly of large firms. On average, the sample firms have an equity turnover ratio of 9.59%, an equity volatility of about 7%, a leverage ratio of 0.33. 45% of the total assets are held as tangible assets, the average asset maturity is over 11, and the average market-to-book ratio is 1.54. On average, 13% of trades are submitted by informed traders, the bid-ask spread is about 36 bp, the analyst earnings forecast dispersion is about 7 cents per share, the accounting disclosure score rank is 63, the Amihud equity and bond illiquidity measures are about 1.91 and 2.51, and $\gamma$ is about 1.4.

Examining the time series average of the pair-wise correlations among the main variables yields several noteworthy points.[12] First, the spreads are negatively related to the corresponding equity size, at a magnitude of −0.42. This indicates a potential size effect on credit yield spreads: the bigger the company, the better priced the bonds. Furthermore, information asymmetry proxies are correlated with spread in an sensible way: *PIN*, *BA*, *DISP*, *AmihudEquity* and $\gamma$ are positively correlated with yield spread, at the levels of 0.31, 0.45, 0.09, 0.15 and 0.21, respectively, while *DISC* is negatively correlated with the spread at −0.04. The correlation between *AmihudBond* and spread is close to zero, possibly due to noise in this bond illiquidity measure.

## 4. Empirical analysis

To investigate the relation between institutional equity holdings and credit spreads while controlling for other well-known spread determinants, we estimate the following regression:

$$\text{Spread}_{i,t} = c_0 + \lambda IO_{i,t} + \sum_{k=1}^{K} c_k \text{Control}_{i,t}^{k} + e_{i,t} \tag{2}$$

[11] Including these extreme observations does not affect our results.

[12] The correlation table is omitted for brevity, and is available upon request.

**Table 2**
Descriptive analysis.

Panel A: bond counts

| | Average number of bonds | | | | Fraction of bonds at the cross-section | | | |
|---|---|---|---|---|---|---|---|---|
| | 1986–1990 | 1991–1995 | 1996–2000 | 2001–2005 | 1986–1990 | 1991–1995 | 1996–2000 | 2001–2005 |
| AAA | 9 | 3 | 11 | 11 | 0.03 | 0.01 | 0.01 | 0.01 |
| AA | 59 | 40 | 37 | 29 | 0.20 | 0.09 | 0.04 | 0.03 |
| A | 170 | 238 | 310 | 363 | 0.56 | 0.56 | 0.35 | 0.39 |
| Baa | 63 | 113 | 273 | 296 | 0.21 | 0.27 | 0.31 | 0.32 |
| Junk | 0 | 29 | 257 | 229 | 0.00 | 0.07 | 0.29 | 0.25 |
| Total | 301 | 423 | 888 | 928 | 1.00 | 1.00 | 1.00 | 1.00 |

Panel B: summary statistics

| | Mean | Std dev | Min | Median | Max |
|---|---|---|---|---|---|
| Institutional ownership | | | | | |
| Spread (bp) | 179.23 | 135.81 | 0.10 | 139.20 | 978.10 |
| *IO* (%) | 58.14 | 17.15 | 0.00 | 59.88 | 96.26 |
| *TRA* (%) | 13.95 | 10.29 | 0.00 | 11.40 | 73.50 |
| *QIX* (%) | 33.85 | 13.24 | 0.00 | 33.10 | 88.50 |
| *DED* (%) | 10.34 | 9.25 | 0.00 | 8.40 | 81.00 |
| Bond characteristics | | | | | |
| IssueSize (B$) | 0.28 | 0.23 | 0.05 | 0.20 | 1.50 |
| Duration | 6.48 | 3.25 | 0.79 | 5.98 | 17.52 |
| Convexity | 0.68 | 0.69 | 0.01 | 0.42 | 3.80 |
| Age (years) | 3.59 | 2.99 | 0.01 | 2.83 | 16.00 |
| Coupon (%) | 7.88 | 1.73 | 0.00 | 7.70 | 15.88 |
| Rating | 9.14 | 3.09 | 2.00 | 8.00 | 19.00 |
| Call | 0.26 | 0.44 | 0.00 | 0.00 | 1.00 |
| Covenants | 0.81 | 0.39 | 0.00 | 1.00 | 1.00 |
| Firm characteristics | | | | | |
| *ESize* (B$) | 15.44 | 28.96 | 0.00 | 6.30 | 307.74 |
| Turnover (%) | 9.59 | 8.47 | 0.03 | 7.37 | 153.80 |
| Volatility (%) | 6.90 | 4.36 | 0.47 | 5.80 | 65.87 |
| Leverage | 0.33 | 0.20 | 0.00 | 0.30 | 0.99 |
| *ATangibility* | 0.45 | 0.13 | 0.09 | 0.47 | 0.74 |
| *AMaturity* | 11.06 | 7.69 | 0.00 | 9.01 | 137.98 |
| *M/B* | 1.54 | 0.67 | 0.81 | 1.31 | 5.25 |
| Information asymmetry measures | | | | | |
| *PIN* (%) | 13.37 | 4.66 | 2.40 | 12.50 | 49.30 |
| *BA* (bp) | 36.16 | 53.69 | 2.30 | 22.20 | 1539.60 |
| *DISP* (%) | 7.38 | 8.62 | 0.00 | 4.00 | 91.00 |
| *DISC* | 62.65 | 29.27 | 0.00 | 70.41 | 100.00 |
| *AmihudEquity* | 1.91 | 3.46 | 0.10 | 0.60 | 24.60 |
| *AmihudBond* | 2.51 | 2.95 | 0.02 | 1.44 | 19.94 |
| $\gamma$ | 1.40 | 1.46 | 0.18 | 0.98 | 11.92 |

Panel A reports average number of bonds over 4 subperiods for different rating groups. Panel B provides the summary statistics for the main variables in our sample. *Spread* is the difference in yield-to-maturity between a corporate bond and a duration-equivalent treasury bond, quoted in basis point. *IO*, *TRA*, *QIX* and *DED* are the percentages of stocks owned by institutional investors and by the transient, quasi-indexing, and dedicated subgroups, respectively. Bond characteristics reported include IssueSize in billion $, *Duration*, *Convexity*, *Age* in years, *Coupon* rate in %, *Rating*, dummies for *Call* and *Covenants*. Firm characteristics reported include *ESize* as the quarter-end size in billion $ of equity; Turnover as the average daily *Turnover* of stocks over the prevailing quarter, in %; Vol as the volatility of the daily stock returns over the prevailing quarter, in %; *Lev* as book value(long-term debt) / (book value(long-term debt) + market value(equity)); *ATangibility* and *AMaturity* as the tangibility and maturity of assets respectively; and *M/B* as the market to book ratio of the assets. Information asymmetry measures include *PIN*, the probability of informed trading following Easley, O'Hara, and Hvidkjaer (2002), in %; *BA*, the average daily bid-ask spread scaled by middle price, in bp; *DISP* analyst forecast dispersion in %; *DISC* the measure of accounting transparency issued by AIMR; *AmihudEquity* and *AmihudBond*, illiquidity measures of equity and bond following Amihud (2002), respectively; and finally $\gamma$, a bond illiquidity measure based on the negative covariance of consecutive price changes following Bao, Pan, and Wang (2008).

where *Controls* consist of bond and firm characteristics that are suggested by the existing bond pricing literature. We replace *IO* with *TRA*, *QIX*, or *DED*, when examining the association of credit spreads with equity holdings by different groups. Under the null hypothesis that institutional equity holdings are unrelated to yield spreads, the slope coefficient of *IO*s, $\lambda$, should be indistinguishable from zero. If corporate governance were the main driver linking institutional ownership to credit spread, we would expect $\lambda$ of *DED* to be significantly different from zero, and that of *TRA* to be indistinguishable from zero. However, if information asymmetry effect dominates the relation between *IO* and spread, we would then expect $\lambda$ of *TRA* (*DED*) to be negative (positive).

Our data is a pooled time series and cross-sectional unbalanced panel data. Credit spreads for a given issue are likely correlated over time, hence we must correct for the bond clustering effect. Moreover, credit spreads may also be correlated across bonds and industries, therefore, we need to correct for the time and industry effect. Given this, we adopt two approaches. The first approach adjusts for bond clustering while controlling for time and industry fixed effects, following Petersen (2009). The second approach is

**Table 3**
Regression of credit spread on institutional equity holdings: whole sample.

| Panel A: whole sample, 45,830 bond-quarter obs, 4263 clusters | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model: | Panel with bond clustering and time & industry fixed effects | | | | | | Fama–MacBeth with HAC adjustment | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| *IO* | | −0.22 | | | | | −0.17 | | | | |
| *t*-stat | | −4.44 | | | | | −2.83 | | | | |
| *TRA* | | | −0.83 | | | −0.80 | | −0.85 | | | −0.68 |
| | | | −8.86 | | | −8.65 | | −4.69 | | | −3.70 |
| *QIX* | | | | −0.24 | | −0.17 | | | −0.27 | | −0.17 |
| | | | | −3.78 | | −2.74 | | | −3.67 | | −2.00 |
| *DED* | | | | | 0.34 | 0.35 | | | | 0.40 | 0.35 |
| | | | | | 3.26 | 3.35 | | | | 2.62 | 2.52 |
| *Bond characteristics* | | | | | | | | | | | |
| IssueSize | −0.38 | −0.32 | −0.97 | −0.13 | −0.36 | −0.77 | 1.57 | 1.36 | 1.54 | 1.98 | 1.16 |
| | −0.23 | −0.21 | −0.62 | −0.09 | −0.22 | −0.50 | 0.78 | 0.68 | 0.75 | 0.99 | 0.58 |
| Duration | −4.85 | −4.79 | −4.64 | −4.79 | −4.78 | −4.54 | −19.98 | −20.12 | −19.97 | −20.30 | −19.87 |
| | −5.20 | −5.17 | −5.00 | −5.17 | −5.11 | −4.89 | −3.39 | −3.42 | −3.40 | −3.45 | −3.40 |
| Convexity | 35.40 | 35.18 | 34.55 | 35.18 | 35.09 | 34.10 | 90.03 | 90.63 | 90.03 | 91.47 | 89.75 |
| | 8.73 | 8.73 | 8.57 | 8.71 | 8.61 | 8.44 | 4.06 | 4.08 | 4.06 | 4.11 | 4.06 |
| Age | 0.47 | 0.50 | 0.33 | 0.53 | 0.45 | 0.35 | 1.80 | 1.63 | 1.71 | 1.68 | 1.62 |
| | 1.16 | 1.23 | 0.82 | 1.30 | 1.11 | 0.87 | 2.86 | 2.53 | 2.76 | 2.71 | 2.56 |
| Coupon | 17.17 | 17.16 | 17.29 | 17.13 | 17.18 | 17.26 | 17.02 | 17.13 | 17.07 | 16.95 | 17.02 |
| | 10.99 | 11.04 | 11.08 | 11.00 | 10.97 | 11.05 | 7.45 | 7.42 | 7.49 | 7.44 | 7.42 |
| Rating | 14.84 | 15.10 | 15.47 | 14.84 | 14.69 | 15.29 | 12.07 | 12.40 | 11.93 | 11.75 | 12.36 |
| | 22.27 | 22.46 | 22.99 | 22.39 | 21.73 | 22.50 | 10.38 | 10.10 | 10.25 | 10.07 | 10.17 |
| Call | 64.61 | 64.09 | 64.51 | 64.36 | 65.05 | 64.79 | 42.94 | 43.22 | 43.13 | 43.50 | 43.36 |
| | 24.26 | 24.21 | 24.25 | 24.26 | 24.42 | 24.42 | 12.33 | 12.29 | 12.32 | 12.43 | 12.55 |
| Covenants | −4.53 | −4.63 | −5.39 | −4.41 | −4.56 | −5.30 | 5.36 | 4.43 | 4.90 | 5.08 | 4.47 |
| | −1.65 | −1.70 | −1.98 | −1.61 | −1.65 | −1.94 | 2.41 | 2.03 | 2.22 | 2.23 | 2.01 |
| *Firm characteristics* | | | | | | | | | | | |
| ESize | −12.21 | −11.93 | −11.95 | −12.03 | −12.28 | −11.91 | −5.91 | −6.03 | −5.93 | −6.27 | −5.78 |
| | −12.03 | −11.71 | −11.78 | −11.83 | −12.09 | −11.72 | −3.51 | −3.44 | −3.39 | −3.56 | −3.28 |
| Turnover | −0.39 | −0.28 | −0.15 | −0.35 | −0.40 | −0.14 | −0.02 | 0.15 | −0.07 | −0.14 | 0.16 |
| | −3.29 | −2.33 | −1.21 | −2.92 | −3.41 | −1.14 | −0.10 | 0.99 | −0.42 | −0.94 | 1.10 |
| Vol | 6.66 | 6.49 | 6.40 | 6.57 | 6.69 | 6.38 | 4.71 | 4.60 | 4.76 | 4.80 | 4.49 |
| | 24.98 | 24.47 | 24.17 | 24.66 | 25.21 | 24.15 | 6.73 | 6.79 | 6.79 | 6.82 | 6.72 |
| Leverage | 80.94 | 77.72 | 75.92 | 78.64 | 80.70 | 74.25 | 46.04 | 43.85 | 45.73 | 47.94 | 43.59 |
| | 11.42 | 10.90 | 10.79 | 11.10 | 11.46 | 10.61 | 4.04 | 3.95 | 3.98 | 4.33 | 4.10 |
| ATangibility | −11.04 | −10.23 | −8.62 | −10.52 | −10.58 | −7.87 | 9.56 | 11.09 | 12.44 | 10.99 | 14.07 |
| | −1.44 | −1.32 | −1.13 | −1.36 | −1.38 | −1.03 | 1.01 | 1.21 | 1.27 | 1.17 | 1.44 |
| AMaturity | −0.83 | −0.84 | −0.86 | −0.82 | −0.82 | −0.83 | −0.53 | −0.49 | −0.54 | −0.50 | −0.48 |
| | −4.84 | −4.89 | −4.95 | −4.80 | −4.76 | −4.83 | −3.33 | −3.24 | −3.35 | −3.12 | −3.04 |
| M/B | 7.46 | 6.49 | 7.03 | 6.73 | 7.79 | 6.87 | 8.28 | 9.31 | 8.37 | 8.97 | 9.04 |
| | 4.80 | 4.15 | 4.52 | 4.32 | 4.97 | 4.37 | 4.75 | 5.01 | 4.81 | 5.06 | 4.92 |
| Adj. $R^2$ (%) | 67.17 | 67.23 | 67.36 | 67.21 | 67.21 | 67.41 | 71.35 | 71.46 | 71.35 | 71.36 | 71.75 |

| Model | Panel B: maturity subsample | | | | | | Panel C: rating subsample | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Short term | | Medium term | | Long term | | A and above | | Baa | | Junk | |
| *IO* | −0.14 | | −0.13 | | −0.04 | | 0.13 | | −0.21 | | 0.16 | |
| *t*-stat | −1.63 | | −2.01 | | −0.48 | | 2.79 | | −3.31 | | 1.53 | |
| *TRA* | | −0.67 | | −0.58 | | −0.71 | | −0.20 | | −0.87 | | −0.43 |
| | | −3.73 | | −4.78 | | −4.68 | | −2.01 | | −8.39 | | −2.51 |
| *QIX* | | −0.24 | | 0.01 | | 0.15 | | 0.11 | | −0.02 | | 0.05 |
| | | −2.14 | | 0.14 | | 1.58 | | 1.74 | | −0.30 | | 0.39 |
| *DED* | | 0.74 | | 0.14 | | 0.22 | | 0.46 | | 0.26 | | 1.19 |
| | | 3.38 | | 0.98 | | 1.62 | | 4.47 | | 1.81 | | 5.06 |
| Adj. $R^2$ (%) | 62.44 | 62.70 | 76.33 | 76.40 | 61.50 | 61.73 | 54.09 | 54.21 | 52.06 | 52.44 | 61.10 | 61.47 |
| (#Obs, #clusters) | (11342 | 1829) | (18794 | 2692) | (15694 | 1379) | (21880 | 1678) | (13801 | 1705) | (10149 | 1852) |

| *F*-test: Short = medium = long | *F*-stat | *p*-val | *F*-test: A above = baa = junk | *F*-stat | *p*-val |
|---|---|---|---|---|---|
| *TRA* | 9.24 | <0.00 | TRA | 41.23 | <0.00 |
| *QIX* | 44.62 | <0.00 | QIX | 19.40 | <0.00 |
| *DED* | 17.36 | <0.00 | DED | 21.20 | <0.00 |

**Table 3** (*continued*)

| Model | Panel D: leverage subsample | | | | Panel E: volatility subsample | | | | Panel F: subperiods | | | | Panel G: Changes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | High leverage | | Low leverage | | High volatility | | Low volatility | | 1986–1995 | | 1996–2005 | | | |
| *IO* | −0.09 | | −0.19 | | −0.25 | | −0.10 | | −0.35 | | −0.16 | | −0.04 | |
| *t*-stat | −1.39 | | −3.58 | | −3.82 | | −2.13 | | −4.31 | | −2.98 | | −0.83 | |
| *TRA* | | −0.81 | | −0.22 | | −0.94 | | −0.32 | | −0.88 | | −0.81 | | −0.18 |
| | | −6.50 | | −2.04 | | 7.95 | | −3.33 | | −3.91 | | −8.60 | | −2.01 |
| *QIX* | | −0.08 | | −0.25 | | −0.17 | | −0.20 | | −0.38 | | −0.06 | | −0.18 |
| | | −0.96 | | −3.53 | | −1.95 | | −3.23 | | −3.48 | | −0.85 | | −3.10 |
| *DED* | | 0.68 | | −0.01 | | 0.47 | | 0.33 | | 0.08 | | 0.47 | | 0.50 |
| | | 4.77 | | −0.05 | | 3.25 | | 3.33 | | 0.49 | | 3.91 | | 5.44 |
| Adj. $R^2$ (%) | 69.37 | 69.64 | 60.59 | 60.61 | 68.32 | 68.53 | 62.64 | 62.76 | 69.81 | 69.94 | 68.99 | 69.20 | 25.26 | 25.48 |
| (#Obs, # clusters) | (22012 | 3201) | (23818 | 2576) | (23486 | 3901) | (22344 | 3293) | (12150 | 1386) | (33680 | 3602) | (20468 | 794) |

| *F*-test: HiLev = LoLev | *F*-stat | *p*-val | *F*-test: HiVol = LoVol | *F*-stat | *p*-val | *F*-test: Pre95 = Post95 | *F*-stat | *p*-val |
|---|---|---|---|---|---|---|---|---|
| *TRA* | 86.29 | <0.00 | *TRA* | 29.75 | <0.00 | *TRA* | 2.06 | 0.15 |
| *QIX* | 0.11 | 0.74 | *QIX* | 0.92 | 0.34 | *QIX* | 3.73 | 0.05 |
| *DED* | 44.05 | <0.00 | *DED* | 41.32 | <0.00 | *DED* | 11.44 | <0.00 |

Panel A reports regression results for Eq. (2) for the whole sample over the period of 1986Q1 to 2005Q4, using two methods: panel regression adjusted for bond clustering effect and time and industry fixed effects; Fama–MacBeth cross-sectional regression with industry dummies and the Newey–West heteroscedasticity and autocorrelation adjusted standard errors. *Spread* is the difference in yield-to-maturity between a corporate bond and a duration-equivalent treasury bond, quoted in basis point. *IO*, *TRA*, *QIX* and *DED* are the percentages of stocks owned by institutional investors, and by the transient, quasi-indexing, and dedicated subgroups, respectively. Bond and firm characteristics are defined as before.

Panels B–F are panel regression results for Eq. (2) adjusted for bond clustering effect and time and industry fixed effects over different sets of subsamples. The same set of independent variables is used as in Table 3A. Panel G reports the first-difference estimation results for Eq. (3). For brevity, we only report the results for the major variables as above.

the Fama–MacBeth cross-sectional analysis with industry dummies and the Newey–West heteroscedasticity and autocorrelation adjustment (HAC) on standard errors.

### 4.1. Effect of various institutional equity holdings on credit spread

Panel A of Table 3 reports the results for the whole sample over the period of Jan. 1986–Dec. 2005, using both the panel regression and the Fama–MacBeth approaches.

As a starting point, we consider in a panel regression variables known to significantly affect credit spreads. The results are summarized under Model 1. Consistent with theories and existing empirical studies, credit spreads significantly increase in coupon rate, credit rating, call dummy, leverage ratio, and equity return volatility, and decrease in covenants dummy. Duration is negatively related to yield spreads and convexity is positively related to yield spreads, both in line with the prediction in Klock, Mansi, and Maxwell (2005). Consistent with the pair-wise correlation results, market capitalization is found to be negatively and significantly related to credit spreads. Credit spread significantly decreases in turnover, suggesting that firms traded more frequently are presumably with better informational environment, and hence lower cost of debt. Credit spread also significantly decreases in asset maturity, which is intuitive since bondholders are better off if assets of firm hold value well over time. The unexpected positive coefficient of *M*/*B* is likely due to collinearity between *M*/*B* and other characteristics: the pair-wise correlation between *M*/*B* and spread is −0.20 and highly significant; moreover, excluding from the regressor set *ESize* and *Rating*, which are strongly correlated with *M*/*B*, we find that the coefficient of *M*/*B* becomes significantly negative.

In Model 2, *IO* is added to the regressor set. First, the coefficient of *IO* is negative, consistent with Bhojraj and Sengupta (2003). Next, we focus on the effects of various types of *IO* on spreads. The results from Models 3 to 6 show that, while a 1% increase in the ownership by *TRA* is significantly associated with a *reduction* of 0.83 bp ($t=8.86$) in credit spreads, a 1% increase in *DED* is significantly associated with an *increase* of 0.34 bp ($t=3.29$) in spreads. These results indicate that the higher the *TRA*, the lower the information asymmetry cost and consequently, the lower the credit spreads. The opposite holds for the *DED* equity holdings. Overall, the sharp contrast between *TRA* and *DED* lends strong support for the information asymmetry hypothesis.

The results from Models 7 to 11 show that using Fama–MacBeth analysis results in similar patterns. For brevity, in the rest of the paper, we only report the panel regression results controlling for bond clustering effect and time and industry fixed effects.

### 4.2. Sub-sample analysis

If the information asymmetry effect is the main driver for the effect of various *IO*'s on credit spread, we would expect the effect to be stronger for bonds where information risk premium is expected to be higher.

Duffie and Lando (2001) predict that information risk should be more pronounced at short maturities: with imperfect information on firm value, the effect of information asymmetry on credit spread can be larger for short-term bonds than for medium and long ones because the probability of default becomes more substantial when bond approaches maturity. We divide the whole sample into three maturity groups: the *ShortTerm* group contains bonds maturing within 5 years; the *MediumTerm* with maturity between 5 and 10 years; and the *LongTerm* maturing in 10–30 years. A panel regression of Eq. (2) is estimated for each group controlling for bond clustering effect and time and industry fixed effect, and the results are summarized in panel B of Table 3. Consistent with Duffie and Lando's (2001) predictions, the effect of institutional equity holdings on credit spread is more pronounced for short-term bonds. In particular, the slope coefficients for *DED* are 0.74 in the short-term sample, as compared to 0.14 for the medium-term sample, and 0.22 for the long-term sample. The null hypothesis of equal coefficients across three subsamples is strongly rejected for *TRA*, *QIX* and *DED*.

Yu (2005) suggests that the effect of information risk is more dramatic for firms with lower credit quality, since investors are more sensitive to a firm's information asymmetry conditions if it is closer to the default threshold. We adopt three proxies for credit quality: credit rating, leverage and equity returns volatility. As shown in panels C, D, and E of Table 3, the effects of institutional equity ownership on credit spreads are stronger for bonds with low credit rating, high leverage and high equity volatility. For example, a 1% increase in *TRA* (*DED*) is associated with a reduction of 0.43 bp (increase of 1.19 bp ) in credit spreads for the junk-bond subsample in panel C, as compared to a reduction of 0.20 bp (increase of 0.46 bp) for the 'A and above' rating subsample. For the high-leverage subsample in panel D, a 1% increase in *TRA* is associated with 0.59 bp more reduction in credit spreads than for the low-leverage subsample, whereas 1% increase in *DED* is associated with 0.69 bp more increase in credit spreads than for the low-leverage one. For the volatility subsample in panel E, a 1% increase in *TRA* is associated with 0.62 bp more reduction in credit spreads than for the low-volatility subsample, whereas 1% increase in *DED* is associated with 0.14 bp more increase in credit spreads than for the low-volatility one. The null hypothesis of equal coefficients across the subsamples is strongly rejected for both *TRA* and *DED*.

To ensure that these findings are not sample period specific, we further segment the data into the early (1986–1995) and late periods (1996–2005). As reported in panel F of Table 3, the distinct pattern in the association of credit spreads with *TRA* and *DED* persists in both sample periods, and is stronger for the latter sample period.

Overall, the whole sample and subsample results are consistent with the information asymmetry hypothesis instead of the corporate governance hypothesis. Under the corporate governance hypothesis, *TRA* investors, who a priori play no monitoring role, are not expected to affect credit spreads. Furthermore, corporate governance hypothesis does not predict any cross-sectional difference between short and long-term bonds and between high and low credit quality groups. Our findings of significant impact by both *TRA* and *DED* on credit spreads, which is stronger especially among short-term bonds and bonds with low credit quality, therefore, lend more support to the information asymmetry explanation.

### *4.3. Changes analysis*

We have documented a strong link between the *level* of credit spreads and institutional equity ownership. In practice, practitioners are also concerned about *changes* in credit spreads. As Collin-Dufresne, Goldstein, and Martin (2001) point out, hedge fund managers often take highly levered positions in corporate bonds. To protect themselves from the interest rate swings, these managers will short treasuries. Therefore, managers are concerned with the *changes* in credit spreads. To explore whether information asymmetry cost, as captured by various types of institutional equity holdings, also affects the evolution of credit spreads over time, we will conduct a panel regression with bond clustering effect and time and industry fixed effects on the following first-difference model:

$$\Delta \mathrm{Spread}_{i,t} = c_0 + \lambda \Delta IO_{i,t} + \sum_{k=1}^{K} c_k \Delta \mathrm{Control}_{i,t}^{k} + e_{i,t}. \tag{3}$$

Motivated by structural models and following Collin-Dufresne, Goldstein, and Martin (2001), we expand the previous control variable set to include changes in term spread (difference in yield to maturities between 10-year and 2-year treasuries), changes in default spread (difference in yields between AAA and Baa bonds), value-weighted CRSP equity market returns, and changes in risk-free rate measured by the yield in 10-year treasuries. To ensure estimation quality, we only consider bonds with over 20 quarters of observation, which leaves a total of 20,468 bond-quarter observations in the analysis. As seen in panel G of Table 3, consistent with our level analysis, there are clear evidences for a distinct effect on credit spreads by transient and by dedicated institutional investors: a 1% increase in *TRA* (*DED*) is related to a reduction of 0.18 bp (an increase of 0.50 bp) in spreads.

### *4.4. Robustness test: controlling for other information asymmetry measures*

To test whether different types of *IO*s provide incremental information on credit spreads, we analyze them in the same regression with other information asymmetry measures suggested by the literature. In particular, the information asymmetry measures considered include *PIN*, *BA*, *DISP*, *DISC*, *AmihudEquity*, *AmihudBond*, and $\gamma$ as discussed in Section 2. A panel regression is estimated controlling for bond clustering effect and time and industry fixed effects for the following equation:

$$\mathrm{Spread}_{i,t} = c_0 + \lambda IO_{i,t} + \phi IA_{i,t} + \sum_{k=1}^{K} c_k \mathrm{Control}_{i,t}^{k} + e_{i,t}. \tag{4}$$

Table 4 reports the results. Other credit spread determinants in Table 3A are also incorporated in this regression; however, we omit them here for brevity.

**Table 4**
Robustness check: controlling for other information asymmetry measures.

| With | *PIN* | | *BA* | | *DISP* | | *DISC* | | *AmihudEquity* | | *AmihudBond* | | $\gamma$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| *IO* | −0.15 | | −0.13 | | −0.26 | | 0.00 | | −0.21 | | −0.35 | | −0.25 | |
| *t*-stat | −2.92 | | −2.53 | | −5.17 | | 0.02 | | −3.90 | | −4.34 | | −3.14 | |
| *TRA* | | −0.62 | | −1.03 | | −1.13 | | −0.84 | | −0.85 | | −1.41 | | −1.25 |
| | | −5.48 | | −11.20 | | −12.83 | | −2.88 | | −8.75 | | −10.74 | | −9.35 |
| *QIX* | | −0.10 | | −0.07 | | −0.20 | | −0.04 | | −0.11 | | −0.29 | | −0.22 |
| | | −1.42 | | −1.02 | | −2.98 | | −0.29 | | −1.64 | | −2.73 | | −2.13 |
| *DED* | | 0.17 | | 0.82 | | 0.70 | | 0.78 | | 0.27 | | 1.66 | | 1.59 |
| | | 1.72 | | 7.42 | | 6.30 | | 3.16 | | 2.48 | | 5.92 | | 5.76 |
| *PIN* (+) | −0.16 | −0.20 | | | | | | | | | | | | |
| | −0.70 | −0.89 | | | | | | | | | | | | |
| *BA* (+) | | | 0.25 | 0.23 | | | | | | | | | | |
| | | | 7.32 | 7.04 | | | | | | | | | | |
| *DISP* (+) | | | | | 0.57 | 0.50 | | | | | | | | |
| | | | | | 5.42 | 4.82 | | | | | | | | |
| *DISC* (−) | | | | | | | −0.08 | −0.06 | | | | | | |
| | | | | | | | −1.52 | −1.33 | | | | | | |
| *AmihudEquity* (+) | | | | | | | | | 0.58 | 0.48 | | | | |
| | | | | | | | | | 1.84 | 1.54 | | | | |
| *AmihudBond* (+) | | | | | | | | | | | −0.42 | −0.88 | | |
| | | | | | | | | | | | −1.17 | −2.37 | | |
| Gamma (+) | | | | | | | | | | | | | 3.51 | 2.53 |
| | | | | | | | | | | | | | 5.00 | 3.61 |
| Adj.$R^2$ | 65.62 | 65.72 | 66.00 | 66.57 | 61.00 | 61.61 | 65.46 | 65.85 | 63.91 | 64.10 | 58.11 | 59.94 | 58.37 | 59.92 |
| (#Obs, #clusters) | (28068 | 3080) | (32054 | 3503) | (34927 | 3630) | (6158 | 757) | (41484 | 3971) | (8392 | 1471) | (8598 | 1467) |

The above are panel regression results for Eq. (4) adjusted for bond clustering effect and time and industry fixed effects. Information asymmetry measures (*IA*) considered include: *PIN*, probability of informed trading in stocks following Easley, O'Hara, and Hvidkjaer (2002), in %; *BA*, stock bid-ask spread scaled by middle price, in bp; *DISP*, analyst forecast dispersion, in %; *DISC*, accounting transparency measures issued by AIMR; *AmihudEquity* and *AmihudBond*, illiquidity measures for stocks and bonds following Amihud (2002), respectively; $\gamma$, a bond illiquidity measure based on the negative covariance of consecutive price changes following Bao, Pan, and Wang (2008). The predicted sign between these *IA*s and credit spreads are given in the corresponding parentheses. All other independent variables in Table 3A are included here. For brevity, we only report the results for the major variables as above.

First, we note that the coefficient of *TRA* remains negative and highly significant in the presence of each of the information asymmetry measures, and that of *DED* remains positive and significant at 10% or higher level. Furthermore, the economic impact from *TRA* and *DED* on credit spread compares favorably with other information asymmetry measures. For example, depending on the choice of information asymmetry measures, the reduction in spread ranges from $10.29\times0.62=6.38$ to $10.29\times1.41=14.51$ bp for one standard deviation increase in *TRA*, and the increase in spread ranges from $9.25\times0.17=1.57$ to $9.25\times1.66=15.36$ bp for one standard deviation increase in *DED*. To compare, one standard deviation increase in *BA*, *DISP*, *AmihudEquity* and $\gamma$ is associated with an increase of spread by about 12.35 bp, 4.31 bp, 1.66 bp and 3.69 bp respectively, and one standard deviation increase in *DISC* is related to a reduction of spread by 1.76 bp.

Overall, these results indicate that the equity holdings by the two different groups, *TRA* and *DED*, carry additional important information on the adverse selection cost, which is priced in corporate bonds.

### *4.5. Robustness test: controlling for equity style*

When making investment decisions, different types of institutional investors may prefer different equity styles. If the *TRA* (*DED*) investors chase specific equity styles and bonds issued by firms with the equity styles tend to have low (high) yield spreads, this can also lead to the distinct impact by these *IO*s on credit spread that we have documented. We refer to this as equity chasing hypothesis. To distinguish the information asymmetry hypothesis from the equity style chasing one, we divide the bond sample based on the issuing firm's equity style. If the distinct pattern in the association of *TRA* and *DED* with credit spread persists within each equity style group, then the equity style chasing hypothesis can be ruled out.

Following the common practice adopted by the academics and practitioners, we use size and book-to-market as the sorting criteria when assigning equity style. At the end of each June, the median NYSE market value of equity is taken as the size breakpoint, and the 30th and 70th percentile NYSE book-to-market ratios are used as the B/M breakpoints. B/M is calculated as the most recent fiscal year-end equity book value, divided by the market value of equity at the end of the previous year. Each issuing firm is assigned to one of the six equity style groups: SVA (small value), SMD (small medium), SGR (small growth), BVA (big value), BMD (big medium), and BGR (big growth). Bonds in this sample are mostly issued by large firms, therefore, we focus on bonds assigned to *BVA*, *BMD* and *BGR* groups in this subsection.

Panel A of Table 5 summarizes the quarterly average number of bonds for 3-by-3 bond portfolios double sorted on equity style and bond maturity. Panel A also reports the means of main variables of interest for each portfolio.

Within each equity style group, a panel regression is estimated for Eq. (2) controlling for bond clustering effect and time and industry fixed effects. The results reported in panel B of Table 5 show that the distinct impact on credit spread by *TRA* and by *DED*

**Table 5**
Robustness check: controlling for equity style.

Panel A: descriptive analysis

| # of firms | *BVA* | *BMD* | *BGR* | Spread (bp) | *BVA* | *BMD* | *BGR* |
|---|---|---|---|---|---|---|---|
| Short | 27 | 52 | 51 | Short | 162.95 | 156.00 | 116.02 |
| Medium | 35 | 86 | 63 | Medium | 169.74 | 161.56 | 142.56 |
| Long | 35 | 78 | 58 | Long | 191.32 | 173.27 | 152.98 |
| *IO* (%) | *BVA* | *BMD* | *BGR* | *TRA* (%) | *BVA* | *BMD* | *BGR* |
| Short | 60.85 | 60.59 | 60.13 | Short | 14.68 | 14.98 | 16.20 |
| Medium | 59.48 | 59.50 | 59.24 | Medium | 13.54 | 14.19 | 15.68 |
| Long | 56.84 | 59.66 | 56.95 | Long | 12.50 | 12.89 | 13.08 |
| *QIX* (%) | *BVA* | *BMD* | *BGR* | *DED* (%) | *BVA* | *BMD* | *BGR* |
| Short | 35.90 | 36.37 | 35.79 | Short | 10.27 | 9.25 | 8.14 |
| Medium | 34.92 | 34.43 | 34.90 | Medium | 11.02 | 10.87 | 8.66 |
| Long | 34.02 | 35.57 | 35.59 | Long | 10.32 | 11.19 | 8.28 |

Panel B: regression results for equity style subsamples

| Model | *BVA* | | *BMD* | | *BGR* | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 1 | 2 | 1 | 2 |
| *IO* | −0.49 | | −0.22 | | −0.10 | |
| *t*-stat | −4.41 | | −3.32 | | −1.53 | |
| *TRA* | | −1.84 | | −0.88 | | −0.42 |
| | | −8.61 | | −7.06 | | −2.90 |
| *QIX* | | −0.32 | | −0.22 | | −0.25 |
| | | −2.27 | | −2.36 | | −2.97 |
| *DED* | | 0.96 | | 0.59 | | 0.72 |
| | | 3.55 | | 3.81 | | 4.61 |
| Adj. $R^2$(%) | 56.95 | 58.13 | 56.88 | 57.33 | 55.86 | 56.18 |
| #Obs | 7089 | | 14994 | | 13036 | |
| #Clusters | 1129 | | 2054 | | 1609 | |

Panel A reports the quarterly average number of bonds, the average spread, *IO*, *TRA*, *QIX* and *DED* for 3-by-3 bond portfolios formed based on bond maturity and equity style (*BVA*, *BMD*, *BGR*), over the period of 1986Q1 to 2005Q4. The medium NYSE market value of equity is the size breakpoint, and the 30th and 70th NYSE B/M are the value/medium/growth breakpoints. *BVA* refers to the big and value style, *BMD* refers to the big and medium style, and *BGR* is the big and growth style. Panel B report the panel regression results for credit spreads for Eq. (2) adjusted for bond clustering effect and time and industry fixed effects for different equity style subsamples. All control variables used in Table 3A are also included here. For brevity, we only report the results for the major variables as above.

persists for all three equity style groups. The contrast is strongest within the *BVA* group: a 1% increase in *TRA* is related to a spread reduction of 1.84 bp, whereas a 1% increase in *DED* is associated with 0.96 bp increase in the spread. For the *BMD* and *BGR* groups, we observe a similar pattern with smaller effect. Overall, the distinct pattern in the link between different *IO*s and credit spreads persists after explicitly controlling for equity style. These evidences favor the information asymmetry hypothesis over the equity style chasing one.

### *4.6. Robustness test: alternative hypothesis of an asset substitution effect*

Jensen and Meckling (1976) show that the conflict of interest between shareholders and debtholders may prompt managers, who presumably act in the interest of shareholders, to adopt risky projects that increase the value of equity at the expense of debt holders. While strong corporate governance is beneficial to shareholders, it may also lead to more asset substitution effect and hence higher cost of debt, as Klock, Mansi, and Maxwell (2005) and Cremers, Nair, and Wei (2007) found. Following this, the more *DED* investors and the stronger governance, the bigger the concern of asset substitution and the higher cost of debt. We refer to this as the asset substitution hypothesis.[13] To distinguish it from the information asymmetry hypothesis, we focus on the impact on credit spread due to the interaction effect between the *DED* ownership and measures of "likelihood" for asset substitution.

First, owners of debt without covenants are less protected and may suffer more from the asset substitution problem. Moreover, Jackson and Kronman (1979) show that with long-term debt, firms are more likely to substitute high-risk projects for low-risk ones since they can gradually and economically alter projects in subtle ways that impair the debtholders. Finally, the asset substitution problem can be more severe for firms with higher growth options in their investment opportunity sets since they have

[13] We thank the anonymous referee for pointing out this alternative hypothesis.

more flexibility in the choice of future investments (Titman and Wessels, 1988; Barclay and Smith, 1995a,b). Therefore, under the asset substitution effect, we would expect a positive impact on credit spread from the interaction of *DED* with indicators for covenant-free bonds, for long-term bonds, and for growth company.

We conduct a panel regression estimation controlling for bond clustering effect and time and industry fixed effects for the following equation

$$\mathrm{Spread}_{i,t} = c_0 + \sum_{j=1}^{3} \lambda^j IO^j_{i,t} + \beta^0 \mathrm{Indicator}_{i,t} + \sum_{j=1}^{3} \beta^j IO^j_{i,t} \times \mathrm{Indicator}_{i,t} + \sum_{k=1}^{K} c_k \mathrm{Control}^k_{i,t} + e_{i,t} \tag{5}$$

where $\beta^j$s capture the interaction effect of asset substitution likelihood indicator with various *IO* ownership. Indicator variables considered include *NoCovenantsDM, LongTermDM* and *GrowthDM*, which take the value of 1 if they are bonds without the protection of covenants, with maturity longer than 10 years, and issued by growth firms, respectively, and take the value of 0 otherwise. The results are reported in Table 6. The estimated coefficients for *DED*×*NoCovenantsDM* and *DED*×*LongTermDM* are −0.59($t$-stat=2.59) and −0.84($t$-stat=5.43), respectively, suggesting that when there is more room for asset substitution, *DED* investors actually help *reduce* credit spread, inconsistent with the asset substitution hypothesis. Although the estimated coefficients for *DED*×*GrowthDM* is negative albeit insignificant, which, again, does not support the asset substitution hyphothesis.

Overall, while we do not completely rule out the asset substitution hypothesis, our results are not supportive of this effect.

### 4.7. Endogeneity of institutional ownership and credit spreads

Institutional investors may self select into holding stocks issued by firms with different costs of debt. If *TRA* investors are attracted to firms with lower cost of debt, whereas *DED* to firms with higher cost of debt, we would still expect a negative (positive) association of credit spread with *TRA* (*DED*), even in the absence of the information asymmetry effect. To address this potential endogeneity issue, we follow Bhojraj and Sengupta (2003) and adopt a simultaneous equation approach with various *IO*

**Table 6**
Alternative hypothesis of asset substitution effect.

| | 45,830 Bond-Quarter Obs. 4263 clusters | | |
|---|---|---|---|
| | Covenants | Maturity | Growth option |
| *TRA* | −0.83 | −0.72 | −0.45 |
| *t*−*stat* | −8.61 | −7.14 | −4.46 |
| *QIX* | −0.18 | −0.47 | −0.26 |
| | −2.78 | −6.32 | −3.72 |
| *DED* | 0.44 | 0.60 | 0.34 |
| | 3.96 | 4.96 | 3.03 |
| *NoCovenantsDM* | 7.17 | | |
| | 0.94 | | |
| *TRAxNoCovenantsDM* | 0.22 | | |
| | 1.00 | | |
| *QIXxNoCovenantsDM* | 0.01 | | |
| | 0.08 | | |
| *DEDxNoCovenantsDM* | −0.59 | | |
| | −2.59 | | |
| *LongTermDM* | | −6.44 | |
| | | −1.07 | |
| *TRAxLongTermDM* | | −0.29 | |
| | | −2.10 | |
| *QIXxLongTermDM* | | 1.03 | |
| | | 8.97 | |
| *DEDxLongTermDM* | | −0.84 | |
| | | −5.43 | |
| *GrowthDM* | | | 2.88 |
| | | | 0.57 |
| *TRAxGrowthDM* | | | −1.31 |
| | | | −10.69 |
| *QIXxGrowthDM* | | | 0.37 |
| | | | 3.64 |
| *DEDxGrowthDM* | | | −0.01 |
| | | | −0.05 |
| *AdjR*$^2$(%) | 67.42 | 67.68 | 67.65 |

Table 6 reports the panel regression results for Equation (5) with interaction effect of asset substitution likelihood indicator with various IO variables, controlling for bond clustering effect and time and industry fixed effects. Indicator variables considered include *NoCovenantsDM, LongTermDM*, and *GrowthDM*, which take the value of 1 if they are bonds without the protection of covenants, with maturity longer than 10 years, and issued by growth firms, respectively, and take the value of 0 if otherwise. All controls variables used in Table 3A are included here. For brevity, we only report the results for the major variables as above.

measures and credit spreads as endogenous variables. At each quarter, a three-stage least square (3SLS) estimation is conducted for the following system:

$$\text{Spread}_{i,t} = a_t^0 + a_t^1 IO_{i,t-1} + \sum_{k=2}^{K} a_t^k \text{Control}_{i,t}^k + e_{i,t} \tag{6}$$

$$IO_{i,t} = b_t^0 + b_t^1 \text{Spread}_{i,t-1} + \sum_{j=2}^{J} b_t^j \text{Control}_{i,t}^j + \epsilon i, t. \tag{7}$$

The choice of control variables in the spread equation follows Eq. (2), and that of the *IO* equation is based on the existing literature on determinants of institutional ownership. In particular, we consider idiosyncratic equity return volatilities, market capitalization, turnover, number of analyst following and analyst forecast dispersion.

We then apply Fama–MacBeth procedures to get the time series average of the estimated coefficients and the Newey–West heterogeneity and autocorrelation adjusted standard errors. The results are reported in Table 7. First, we compare the *IO* equations across the four systems. While System 1 suggests no significant effect on the *total* institutional ownership by cost of debt, Systems

**Table 7**
Endogeneity control: simultaneous estimation using 3-stage least square procedure.

| | System 1 | | System 2 | | System 3 | | System 4 | |
|---|---|---|---|---|---|---|---|---|
| | Spread | *IO* | Spread | *TRA* | Spread | *QIX* | Spread | *DED* |
| Spread | | 0.00 | | 0.01 | | −0.01 | | 0.01 |
| t-stat | | 0.80 | – | 4.31 | | 6.24 | | 9.17 |
| *IO* | −0.01 | | | | | | | |
| | −0.03 | | | | | | | |
| *TRA* | | | −2.46 | | | | | |
| | | | −2.06 | | | | | |
| *QIX* | | | | | −0.88 | | | |
| | | | | | −1.08 | | | |
| *DED* | | | | | | | 3.21 | |
| | | | | | | | 3.68 | |
| Bond characteristics | | | | | | | | |
| IssueSize | 1.36 | | 0.13 | | 0.81 | | 4.27 | |
| | 0.67 | | 0.07 | | 0.46 | | 3.51 | |
| Duration | −11.65 | | −10.26 | | −11.02 | | −13.52 | |
| | −3.92 | | −3.97 | | −3.92 | | −4.84 | |
| Convexity | 57.46 | | 53.24 | | 54.70 | | 64.63 | |
| | 5.22 | | 5.29 | | 5.10 | | 6.26 | |
| Age | 0.12 | | −0.34 | | −0.58 | | −0.34 | |
| | 0.20 | | −0.47 | | −0.96 | | −0.66 | |
| Coupon | 17.92 | | 19.35 | | 18.44 | | 18.83 | |
| | 13.32 | | 12.53 | | 14.22 | | 14.25 | |
| Rating | 9.55 | | 9.59 | | 9.48 | | 7.90 | |
| | 9.52 | | 9.85 | | 7.44 | | 9.17 | |
| Call | 44.85 | | 45.13 | | 44.49 | | 45.74 | |
| | 11.17 | | 12.70 | | 13.21 | | 13.67 | |
| Covenants | −7.33 | | −11.29 | | −12.34 | | −5.72 | |
| | −1.81 | | −3.51 | | −3.74 | | −2.22 | |
| Firm characteristics | | | | | | | | |
| *Esize* | −7.91 | −2.23 | −9.25 | −0.74 | −12.20 | −0.76 | −9.89 | −0.80 |
| | −3.76 | −9.51 | −6.19 | −7.42 | −10.00 | −4.94 | −8.17 | −6.36 |
| Turnover | 0.02 | 0.78 | 0.54 | 0.40 | 0.40 | 0.33 | −0.27 | 0.05 |
| | 0.03 | 10.07 | 0.98 | 10.13 | 0.42 | 7.86 | −0.83 | 2.32 |
| Vol | 3.13 | −0.60 | 2.59 | −0.14 | 3.93 | −0.56 | 2.18 | 0.02 |
| | 4.01 | −4.50 | 3.67 | −2.50 | 2.99 | −6.33 | 3.09 | 0.48 |
| Leverage | 29.34 | | 30.27 | | 52.20 | | 16.17 | |
| | 3.22 | | 2.48 | | 2.73 | | 1.15 | |
| *ATangibility* | 50.38 | | 30.01 | | 70.89 | | 42.91 | |
| | 2.40 | | 1.71 | | 3.35 | | 3.01 | |
| *AMaturity* | −0.79 | | −0.71 | | −0.97 | | −0.72 | |
| | −2.48 | | −3.52 | | −5.25 | | −4.12 | |
| *M/B* | 1.29 | | 3.12 | | 6.92 | | 4.03 | |
| | 0.66 | | 1.29 | | 2.79 | | 2.33 | |
| *#A* | | 1.98 | | 0.54 | | 0.89 | | 0.51 |
| | | 3.87 | | 2.37 | | 2.63 | | 1.74 |
| *DISP* | | −0.02 | | −0.04 | | −0.06 | | 0.09 |
| | | −0.75 | | −3.23 | | −2.87 | | 6.31 |

Table 7 reports simultaneous equation results regarding effect of institutional equity ownership on credit spread and effect of spread on institutional ownership for the period of 1986Q1 - 2005Q4. All controls variables used in Table 3A are included in the spread equation. The control variables in the *IO* equation include *Esize*, *Turnover*, *V ol*, *#A* and *DISP*.

2–4 indicate strong heterogeneity across *IO* groups. The loading on *Spread* for *QIX* is significantly negative, but significantly positive for both *TRA* and *DED*, suggesting that *TRA* and *DED* investors tend to be attracted to firms with higher cost of debt.

Switching to the spread equations, we find that after allowing for institutional investment to be influenced by credit spreads, the presence of *TRA* and *DED* has different effect on credit spread. Although *TRA* investors tend to be attracted to firms with higher cost of debt, their presence on the other hand reduces the spread: credit spread narrows by 2.46 bp ($t = 2.06$) for a 1% increase in *TRA*. In contrast, the presence of *DED* investors is significantly associated with a widening of bond yields: for a 1% increase in *DED*, the spread goes up by 3.21 bp ($t = 3.68$).

Overall, our results suggest that the distinct relationship between various institutional groups and credit spreads survives endogeneity control.

## 5. Conclusion

This paper is part of the burgeoning literature that distinguishes institutional investors based on their trading and investment styles. A unique feature of this study is the use of equity holdings by different groups of institutions: transient, quasi-indexing, and dedicated investors. This decomposition helps to uncover important variation across institutional groups in the way they are related to information asymmetry and corporate governance.

Our contribution is two-fold. First, this paper highlights the importance of distinguishing various types of institutional investors. We find that the separate effects of *TRA* and *DED* on credit spreads differ in signs. This suggests that treating all institutional investors as a homogenous group and lumping them together will impede uncovering any genuine link between institutional ownership and cost of debt.

Second, we provide a new explanation on the link between institutional investor and cost of debt. Existing studies largely ascribe a corporate governance role to institutional investors when examining their effect on a company's borrowing cost. Ours is the first paper to relate the distinct institutional holdings to information asymmetry. We find that credit spreads narrow (widen) with an increase in equity holdings by transient (dedicated) investors, and more so for bonds with shorter maturity and lower credit qualities. These results are in supportive of the information asymmetry explanation, but not the corporate governance which predict no effect on credit spread by the transient investors who are least likely to monitor. The explanatory power of the subgroups of *IO*s for credit spreads is shown to survive the control of other traditional information asymmetry measures, and the economic impact of these *IO*s on spread compares favorably with that of the traditional measures. This is consistent with the notion that institutional investors, being sophisticated, can better assess information risk conditions beyond what is captured by publicly available information asymmetry measures. Furthermore, the endogeneity check shows that while both *TRA* and *DED* investors are attracted to firms with higher borrowing cost, the presence of *TRA* (*DED*), however, tends to reduce (increase) the borrowing cost.

Collectively, our findings show that information asymmetry, as captured by the subgroups of *IO*s, is an important factor in corporate bond pricing. Overall, our findings are of fundamental importance both for bond investors and for corporate investor relation management. For instance, there is an increasing trend for companies to hire professionals to attract institutional investors. They do so in the hopes of achieving a stable ownership base that helps to stabilize stock prices in the event of temporary shocks. Given the different effect on cost of debt associated with various types of institutional groups, corporate managers should ensure that they are pitching to the *right* group, so that companies will not suffer from rising cost of debt due to a deterioration in information asymmetry condition.

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