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Issuer Term Variability, Bond Yield Spreads, and Reaching for Yield

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We examine how variations in non-financial terms across bonds from the same issuer, referred to as "issuer term variability" (ITV), relate to bond yield spreads, returns, and investor bases. Our findings show that ITV is positively associated with yield spreads, even after accounting for the issuer's credit ratings and other credit risk proxies. Additionally, bonds with high ITV exhibit greater default risk but deliver lower risk-adjusted returns compared to those with low ITV. We also find that yield-seeking investors are more likely to own bonds with high ITV, and bond funds that reach for yield also tend to favor high ITV bonds. These results suggest that some investors specifically target high ITV bonds to achieve higher yields, even at the cost of lower returns. Further analysis indicates that reaching for ITV is difficult to justify as rational risk-taking by constrained investors.

Key Words: Corporate Bond Terms; Reaching for Yield; Asset Complexity; Bond Investor Base
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Introduction

It is well documented that corporate debt structure is heterogeneous and that this heterogeneity influences the firm's capital structure and debt choice (Colla et al. 2013; Lou and Otto 2020; Rauh and Sufi 2010). However, the pricing effect of debt heterogeneity has received less attention. We investigate this issue by focusing on corporate bonds and studying whether heterogeneity in the bond offering by a firm affects the firm's bond prices and bond investor base. In particular, we investigate how variation in the non-financial terms across bonds of the same issuer ("issuer term variability," or ITV hereafter) is related to the issuer's bond yield spreads, realized returns, and the clientele who hold its bonds. The contractual terms of bonds involve several different bond features, such as coupon, maturity, embedded optionality, and special arrangements.[1]

Such issuer term variability, while enabling the firm to gain flexibility in bond financing, may negatively affect bond prices. One reason is the higher cost of analysis: greater variability in bond terms for a given issuer requires investors to conduct more costly analysis when evaluating that issuer's bonds. This is because bond-specific terms on one bond, meant to affect only the bond in question, may change the cash flow rights and protections of all other bonds issued by the same issuer, hence creating uncertainty about future bond payoffs and making it more difficult to assess the issuer's bonds.[2] Thus, investors who go through such costly analysis and end up holding the bonds, in turn, will demand higher yields to compensate for these costs. This suggests *the costly analysis channel*.[3]

Alternatively, issuer term variability may reflect greater issuer risk not captured by credit ratings or other firm characteristics associated with credit risk in a strict sense. For instance, some (riskier) issuers include specialized terms in their bonds to enable easier expropriation of bond holders, while others do so

[1] Firms issue bonds with different features because, unlike credit default swaps (CDS) with standardized terms, corporate bonds are not uniform in their offering terms.
[2] Greater variability in bond terms can hinder firms from using "comparable pricing" for new issues, a key pricing determinant in corporate credit markets (Murfin and Pratt 2019). This is because when the diverse characteristics of the new issue may make it difficult to compare with existing bonds.
[3] The cost is particularly high when an issuer has many outstanding bonds. For instance, in 2020, over 2,500 non-financial corporations had nearly 10,000 bonds outstanding (SEC 2020).

for legitimate business reasons. Since bond investors have difficulty distinguishing between those two types of issuers, they will pool together in equilibrium, resulting in a yield premium for ITV as compensation for adverse selection.[4] Likewise, investors may demand more bond-specific terms to protect themselves when the issuer's fundamental risk is higher, also resulting in a positive association between ITV and yield spreads. We refer to this mechanism as *the risk channel*.

Using a sample of US bond issuers that made public issues of corporate bonds during the 1998–2018 period, we first investigate the relationship between bond yield spreads and the variability of terms across an issuer's bonds. We find this relationship to be positive and significant, even after controlling for credit ratings, credit risk measures, and other well-known determinants of yield spreads. A one-standard deviation (SD) increase in ITV is associated with an approximately 15 basis points (bps) higher yield spread. The economic magnitude is substantial, considering that a one-notch change in credit rating is associated with a 44-bps increase in bond yields. We also show that this effect is stronger for more opaque issuers and during periods of high macroeconomic uncertainty. These results are consistent with both the costly analysis and risk channels.

Next, we find that firms with significant variation in the terms of their outstanding bonds are more likely to experience defaults or subsequent credit rating downgrades. This finding suggests that issuer term variability captures a dimension of bond risk that is not fully reflected by credit ratings and sometimes surpasses the information provided by the issuer's accounting and market data related to credit risk. The positive link between ITV and issuer default risk is consistent with the *risk channel*.

To further distinguish between the risk story and the costly analysis story, we examine whether the higher yield spreads associated with greater ITV result in larger risk-adjusted returns. Running asset pricing tests standard to the bond literature (e.g., Dickerson et al. 2023; Goldberg and Nozawa 2021), we find that high ITV bonds, despite their higher yield spreads, provide *lower* risk-adjusted returns than low ITV bonds, even after controlling for credit ratings and systematic risk exposure. This result is hard to reconcile with a

[4] This aligns with industry practice, where bonds with unusual indenture terms trade at higher yields, known as the 'plain vanilla premium'.

positive information-analysis premium. In contrast, it would be more consistent with a risk channel, where certain investors reach for yield by loading up on high (and risky) ITV bonds, leading to inflated valuations and low abnormal returns for these bonds. This is in line with the reaching-for-yield (RFY) and betting-against-the-beta (BAB) (Frazzini and Pedersen 2014) literature. Indeed, it is well documented that reaching-for-yield (RFY) negatively predicts risk-adjusted returns, implying that those investors are sacrificing alpha for yield (e.g., Chen and Choi 2023).[5]

We conduct further tests to determine whether investors holding high ITV bonds tend to reach for yield more than other investors. Following Choi and Kronlund (2018), we measure institutional bond investors' tendency to reach for yield by assessing the extent to which they tilt their portfolios toward bonds with yields that are high relative to those of other bonds with the same rating and maturity. We find that institutions holding high ITV bonds indeed tend to reach for yield more than holders of low ITV bonds.

Why would reaching-for-yield investors load up on high ITV bonds, even if these bonds have negative alphas? We propose two competing hypotheses. First, asset managers are often constrained to hold bonds with high ratings. Some may desire higher returns than can be achieved by holding only fairly-priced bonds they are permitted to hold. As a result, they load up on the riskiest bonds they can, which tend to be overpriced but may still offer high gross-of-risk expected returns. Second, some asset managers may be naïve and fail to understand that the higher yields of ITV bonds compensate for risks not captured by ratings, leading them to mistakenly believe they are getting a free lunch.

We attempt to distinguish between the rational constrained risk-taking hypothesis and the naïve free lunch hypothesis for reaching for yield. To some degree, the previously reported asset pricing tests can address this question: our finding that the *non*-risk-adjusted returns (as well as risk-adjusted ones) on high ITV bonds are lower than those of low ITV bonds, despite their higher yield spreads, suggests that the act of reaching for yield by loading up on high ITV bonds will not lead to higher raw return. Using a panel of

[5] The phenomenon of reaching-for-yield (RFY)—where investors prefer high-yielding bonds within the similar rating and maturity—appears across different fixed income markets. This has been observed in studies by Becker and Ivashina (2015) for insurance companies, Choi and Kronlund (2018) for mutual funds, and Di Maggio and Kacperczyk (2017) for money market funds.

investment grade (IG) bond fund holdings, we conduct a further test by regressing the proportion of a fund's BBB holdings on our measures of the fund reaching for ITV. If reaching for ITV were a rational response by yield-reaching investors with portfolio holding constraints, then IG fund managers should not be holding significant amounts of A or AA bonds, since tilting the portfolio toward more fairly priced BBB bonds would be a superior strategy than reaching for higher-yielding A or AA bonds that are likely to underperform. The positive coefficients in the aforementioned regression would be consistent with such behavior, but our regression results show insignificant and negative coefficients. This is difficult to explain on the basis of the constrained risk-taking story of bond funds' reaching for ITV.

Our paper contributes to bond literature by highlighting that complex (high-ITV) bonds trade at higher yield spreads. While prior studies on asset complexity have focused on structured financial products (Brunnermeier and Oehmke 2009; Célérier and Vallée 2017; Griffin et al. 2014; Sato 2014) or experimental settings (Carlin et al. 2013), our research takes a broader approach by linking the complexity of security valuation to the entire suite of securities offered by an issuer, rather than just the complexity of individual securities or underlying cashflows.

Second, our paper contributes to the literature on 'reaching for yield' (e.g., Becker and Ivashina 2015; Choi and Kronlund 2018; Rajan 2011). We document that bond funds increase their holdings of high-ITV bonds, aligning with this behavior. Moreover, our findings suggest that reaching for yield through ITV may be irrational and difficult to reconcile with regulatory capital requirements, offering new insights into *why* certain fixed-income investors pursue yield—a topic that has not yet been thoroughly explored in the literature.

Lastly, our study contributes to the literature on debt structure. While previous research has focused on how it varies across firms and economic factors influencing it (e.g., Colla et al. 2013; Rauh and Sufi 2010), our study highlights the asset pricing implications for bond values and investor preferences. We introduce a new perspective on bond heterogeneity over traditional concerns like bondholder-shareholder conflicts.

Our findings suggest that fragmentation in corporate bond issuance could increase a firm's cost of financing. This aligns with the view that standardizing corporate bonds could reduce trading frictions, enhance liquidity, and support regulatory proposals to promote public trading on regulated exchanges (BlackRock 2013; Oehmke and Zawadowski 2017).

2. Construction of Variables and Sample

Our data come from several databases. Bond issuance details, including maturity, rating, coupon, offering date/amount, and indenture features (e.g., covenants and callability), are obtained from Mergent FISD. Bond pricing data are from NAIC and TRACE. Institutional bond holdings at quarter-end are gathered from Lipper eMAXX for insurance companies, pension funds, and mutual funds. Monthly fund portfolio holdings and characteristics (e.g., age, size, and expense ratio) of mutual funds are extracted from the CRSP Mutual Fund database. Firms accounting and market variables are downloaded from COMPUSTAT and CRSP, respectively. We focus on non-financial straight corporate bonds, excluding preferred bonds and government-sponsored enterprise bonds.[6] Our sample consists of all public bond issuers (excluding financial and utility sectors) available in the FISD database from 1998Q2 to 2018Q1. The following subsections detail our issuer term variability measure and sample selection procedures.

2.1 Measure of Issuer Term Variability

A corporate bond encompasses numerous indenture features, such as size, ratings, maturity, security, seniority, coupon rate, protective covenants, call provision and convertibility. Due to lack of standardization in corporate bond issuance, a firm may articulate its bond structure across multiple issues with highly dissimilar characteristics. This variability in contractual terms among bonds issued by the same entity increases the complexity and difficulty in understanding the issuer's bonds. We quantify this variation in bond terms using the Euclidean distance between vectors of bond features.[7] Specifically, each bond issued

[6] We limit our bond sample to those classified under FISD bond types: CCOV, CCUR, CDEB, CLOC, CMTN, CMTZ, CPAS, CPIK, CS, or CZ.

[7] We also consider, but do not tabulate, results based on an alternative measure of issuer term variability, the Cosine distance (ITV^c) measure. These results are largely consistent with those obtained using the Euclidean distance measure. Both Euclidean and Cosine

by a particular entity is associated with a multidimensional vector of observed bond feature indicators sourced from FISD, and calculate the distance between pairs of bonds and then compute issuer term variability (*ITV*), defined as the average pairwise bond distance at the issuer level (refer to Appendix for further details):

$$ITV \equiv 2 \times \sqrt{\frac{1}{K}\sum_{k=1}^{K}\left(\frac{\sum_{j=1}^{N}\left(\mathbb{I}_{jk} - \mu_k\right)^2}{N}\right)}, \quad (1)$$

where N is the number of a firm's outstanding bonds, K is the number of bond feature categories under consideration, $\mathbb{I}_{jk}$ is a dummy variable indicating the presence of a k^{th} bond feature for a j^{th} bond, and μ_k is the sample (value-weighted) average of the feature indicator within a firm, i.e., $\mu_k = \sum_{j=1}^{N} \omega_j \mathbb{I}_{jk}$ where ω_j is the fraction of bond j's amount.[8] We consider eleven bond feature indicators: redeemability, callability, putability, convertibility, exchangeability, presence of covenants, presence of credit enhancement, presence of collateral, (foreign) currency denomination, variability of coupons and maturity.[9] Our selection of bond features aims to encompass as many major contractual terms as possible. Conceptually, our measure is akin to Oehmke and Zawadowski's (2017) approach to measuring bond standardization in CDS trading.

ITV, as defined in Equation 1, can also be interpreted as the square root of the average cross-bond feature variance, multiplied by two to scale up so that it is bounded between zero and one. A variability of zero indicates that a firm's bonds have identical features, or that the average feature variance is equal to zero (i.e., μ_k equals either 0 or 1 for all k). A maximum variability of one represents the opposite scenario, where the average feature variance is 0.25 (i.e., μ_k equals 0.5 for all k). This implies that issuer term

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distance measures are well-established in textual analyses and have recently been used in finance literature. For example, Cai et al. (2018) use Euclidean distance to examine similarities in banks' syndicated loan portfolios. Cosine distance has been used to assess portfolio overlap among funds (e.g., Girardi et al. 2021; Sias et al. 2016) and to evaluate dissimilarities between loan contracts (e.g., Ganglmair and Wardlaw 2017).

[8] We also explore two alternative approaches by slightly adjusting the original measure in Equation 1. First, we use a different benchmark for computing the average of bond feature indicators (μ_k). Instead of considering only N bonds within a firm, we use all available M bonds in the market that match the focal bond (the j^{th} bond) based on characteristics such as issuance year, maturity, and current credit rating. For details, see Equation (A.7) in the Appendix. Second, we compute a value-weighted average of squared deviations of bond features. Rather than dividing the squared deviation by N as in Equation 1, we calculate a weighted sum using the fraction of the j^{th} bond's amount.

[9] For covenants, we use detailed data from FISD categorizing them into fifteen types based on Billett et al. (2007).

variability takes a larger (smaller) value when a firm's decisions on bond features are more ad hoc (systematic) for each bond.

2.2 Sample Construction

We merge our issuer term variability measure with bond characteristics from Mergent FISD such as rating and maturity, and combine these with firm-level bond yield spreads, calculated using quarter-end prices of corporate bonds from TRACE and NAIC and Treasury bills. For bond ownership information, we utilize quarter-end institutional bond holdings data from eMAXX. Issue-level characteristics and prices are aggregated at the issuer level using the amount-weighted averages. This results in 60,874 firm-quarter observations from 1998Q2 to 2018Q1, with no missing variables. The sample reduces to 39,638 observations when merged with CRSP and COMPUSTAT for issuer accounting and market information, which we use for most of our empirical analyses. For bond-level asset pricing tests, we use 271,657 issue-month observations from May 2005 to May 2018. Our mutual fund-level sample, constructed from the CRSP Mutual Fund database, includes 76,022 fund-month observations from September 2003 to March 2018.

[TABLE 1 HERE]

Panel A of Table 1 presents summary statistics for the main variables in our final sample. The mean yield spread is 397 bps, reflecting the inclusion of private firms. The average issuer has a BB+ credit rating, an eight-year maturity, and an average bond age of 4.6 years. These figures are consistent with prior studies on US public and private bonds from FISD (e.g., Badertscher et al. 2019; Kovner and Wei 2014). The mean issuer term variability (*ITV*) is 0.40, well below the maximum value of one, indicating non-random bond feature choices (e.g., Kieschnick and Wardlaw 2019). *ITV* has a standard deviation of 0.24 and is positively correlated with credit risk measures (e.g., bond rating, z-score, default probability) and bondholder dispersion, as proxied by the logarithm of the number of outstanding bond issues (see Panel B of Table 1).

3. Empirical Findings

3.1 Yield Spread Effects of Issuer Term Variability

3.1.1. Baseline Results

We analyze the relationship between issuer term variability and average yield spreads of the issuer's bonds using a firm-quarter panel regression with firm- and quarter-fixed effects. Standard errors are clustered by firm and quarter, to account for serial and cross-sectional correlations:

$$YS_{i,t} = a + b \times ITV_{i,t} + \boldsymbol{c} \times \sum Controls_{i,t} + \alpha_i + \delta_t + \varepsilon_{i,t} \quad , \quad (2)$$

where $YS_{i,t}$ is the (percentage) bond yield spread for firm i in quarter t, calculated as the value-weighted average of its bond yield spreads, which is the yield to maturity of the bonds minus the yield of a Treasury bond with the same maturity. $ITV_{i,t}$ is our main variable capturing the term variability of the bond issuer for firm i in quarter t.

As control variables, we use five key bond characteristics—*Rating*, *Maturity*, *Illiquidity*, *Size*, and *Age*—aggregated at the firm level using value-weighted averages. *Rating* is the bond's credit rating on a scale from 1 (AAA) to 21 (C). *Illiquidity* is measured by the Amihud (2002) method. *Maturity* is the time remaining time until maturity in years. *Size* and *Age* are the natural logarithms of the outstanding bond amount (in thousands) and bond age (in years), respectively. We also include two firm-level variables to control for fundamental risks: the logarithm of the number of outstanding bond issues (*Bond Number*), to proxy for distress costs due to coordination failures among bondholders (Asquith et al. 1994; Gilson et al. 1990), and credit risk measures: Altman's (1968) Z-score (*Zscore*) and Merton's (1974) expected probability of default (*EPD*) using accounting and market information, respectively.

To differentiate between variation in bond terms within an issuer and deviations from market norms, we create a new measure of issuer term variability, ITV^{mkt}. This is similar to *ITV* but uses a different benchmark. Instead of the issuer's average bond features (μ_k) in Equation 1, ITV^{mkt} uses the market-wide average for bonds matched by offering year, maturity, and credit rating (details in the Appendix).

Table 2 presents our baseline results across six specifications. Initially, without any controls (Specification 1), we observe a strong association between issuer term variability (*ITV*) and bond yield spreads (*YS*): a one-SD higher *ITV* is correlated with a yield spread approximately 29 bps higher. This might reflect omitted variable bias related to ITV. To address this issue, we introduce bond rating as a control, considering that firms with greater ITV might be riskier.[10] Once we control for bond rating (*Rating*), the effect of ITV diminishes as expected, though it remains statistically significant but reduced by half in magnitude (Specification 2). This suggests that while issuer term variability partly captures risks reflected in bond rating, it also represents other dimensions of bond pricing effects.

The effect of ITV on yield spreads becomes stronger in both magnitude and statistical significance when additional bond characteristics like *maturity*, *illiquidity*, *bond size* and *bond age* are included (Specification 3). The estimates for the control variables are largely intuitive (e.g., higher yield spreads for riskier, older, and more illiquid bonds), but some warrant further explanation. Notably, the negative coefficient for bond maturity might seem counterintuitive but is consistent with recent research on bond rollover risk (e.g., Chen et al. 2020), suggesting that rollover risk is higher for short-term bonds. Bond size, typically a rough indicator of liquidity, appears statistically insignificant, possibly because the Amihud (2002) bond illiquidity measure accounts for this effect.

In Column 4, we include three additional variables to control for the firm's fundamental risks, confirming the robustness of the results. Distress costs from coordination failure among bond investors during debt renegotiation can be linked to issuer term variability, as issuers with more bonds outstanding tend to have more varied bond terms.[11] To separate issuer term variability from distress costs, we use the logarithm of the number of bond issues, labelled as *Bond Number*. The coefficient for *Bond Number* is statistically insignificant.

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[10] For example, Rauh and Sufi (2010) find that low credit-quality firms are more likely to have a multi-tiered debt structure than high-credit-quality firms.

[11] Literature indicates that coordination among creditors becomes more challenging as their number increases, leading to higher distress costs (e.g. Gertner and Scharfstein 1991; Bolton and Scharfstein 1996). However, the effect of these distress costs on bond yields is nuanced. For instance, having more bondholders might actually lower bond spreads by reducing strategic defaults (Davydenko and Strebulaev 2007).

To address concerns that bond ratings may not fully capture an issuer's credit risk, we control for two widely used credit risk measures: Altman's (1968) Z-score (*Zscore*) and Merton's (1974) expected probability of default (*EPD*). Both variables, as expected, show strong explanatory power for yield spreads, with t-statistics as high as 12.10. A lower *Zscore* (indicating higher bankruptcy risk) and a higher *EPD* correspond to higher yield spreads. Once distress costs and credit risk variables are included, the constant term in the regression becomes insignificant, highlighting their importance in determining yield spreads. Notably, the bond rating effect remains strongly significant and is not diminished by the inclusion of *Zscore* and *EPD*. This is consistent with the literature suggesting that credit risk is multidimensional, with no single measure capturing all relevant information (e.g., Hilscher and Wilson 2017).

While ITV captures *within-issuer* variation in bond terms, one might argue that its impact is due to bond terms deviating from *market* norms, with the market demanding higher yields for bonds with unusual indenture terms. If issuers typically align their terms with market standards but occasionally issue bonds with non-standard terms for specific reasons, our measure of within-firm indenture term variability could mistakenly reflect how much a bond's terms differ from the market standard, potentially creating a spurious correlation with yield spreads. To address this, we include a regressor (ITV^{mkt}) that measures how much a bond's terms differ from other bonds with similar offering dates, maturity, and credit ratings across the market. We find that the coefficient on *ITV* remains unchanged in both magnitude and statistical significance, while ITV^{mkt} lacks significant explanatory power for bond yield spreads (Specification 5).

Since all our specifications are at the firm level, we first calculate a weighted average of bond-level characteristics (e.g., rating, maturity, and illiquidity) to aggregate them at the firm level. We then regress the weighted average of yield spreads on these aggregated characteristics. A concern with this approach is that it might not fully account for nonlinear effects of those characteristics on yield spreads. To address this, we calculate bond-level abnormal yields by subtracting from each bond's yield a characteristics-based benchmark yield–specifically, the weighted average yield of other bonds with similar ratings, maturity, and liquidity (Daniel et al., 1997). We then aggregate these abnormal yields at the firm level. Our results remain robust when we replace yield spreads (*YS*) with abnormal yield spreads (*Abn_YS*) as the dependent variable (Specification 6).

The results in Table 2 indicate that greater variability in an issuer's bond indenture terms is associated with higher yield spreads–a finding not previously reported in the literature. Various regression specifications confirm that this effect is driven by bond term variation itself, not by credit risk or distress costs. In the most conservative model (Specification 5), a one-SD increase in ITV is associated with a roughly 15 bps higher yield spreads. For context, the same regression shows that a one-notch downgrade in bond credit ratings corresponds to a 44 bps increase in yield spreads.

[TABLE 2 HERE]

3.1.2 Economic Mechanism: Costly Analysis and Greater Risk

After establishing the positive association between ITV and bond yield spreads, we now explore the underlying economic channels. We consider two possible explanations. First, greater variability in an issuer's bond terms requires investors to conduct more costly analysis. As a result, investors who undertake this analysis and end up holding the bonds demand higher yields to compensate for these costs (the costly analysis channel).

Second, issuers with high ITV may carry greater risk not captured by credit ratings or other firm characteristics (the risk channel). When firms include unusual terms in their bonds, the market may suspect ulterior motives, leading to higher yields as compensation for adverse selection. Knowing that the market will demand higher yields for non-standard terms, firms with questionable motives will pool with those having legitimate business reasons for the unusual terms, resulting in higher equilibrium credit risk for bonds with unusual terms and thus higher spreads.[12] Additionally, investors may seek more specific terms to protect themselves when the issuer's fundamental risk is higher, further strengthening a positive association between ITV and yield spreads.

[12] We thank the referee for suggesting this alternative channel for ITV's yield spread effects.

To explore these channels, we first examine whether the ITV premium is higher for more opaque firms as shown in Table 3. The positive and statistically significant interaction between ITV and a dummy for high opacity firms supports this (Specifications 1 and 2).[13] For the time-series analysis, we find that ITV premiums are higher during periods of heightened economic uncertainty, as indicated by the VIX index, and find that the ITV premium is higher during periods of greater economic uncertainty (Specifications 3 and 4). Additionally, introducing a triple interaction term among *ITV*, opacity, and VIX confirms that the ITV premium is highest for opaque firms during times of greater economic uncertainty (Specifications 5 and 6). These results suggest that issuer term variability affects yield spreads due to the information costs of analyzing future bond payoffs, supporting the costly analysis channel.[14] They also align with the risk channel, as risk premiums are higher with increased opacity and ambiguity.

[TABLE 3 HERE]

We next investigate whether firms with high variability in bond terms are more likely to face defaults or credit rating downgrades compared to firms with more standardized bonds. We regress a dummy for defaults and downgrades on our issuer term variability measure, with results shown in Table 4. After controlling for key bond characteristics like rating, maturity, and liquidity, higher ITV predicts bond defaults within one year (Specification 1) and three years (Specification 3), as well as rating downgrades within one year (Specification 5). This suggests that bonds with higher ITV have higher default and downgrade rates than expected for bonds with similar characteristics.

When controlling for issuer risk with variables like *Bond Number*, *Zscore*, and *EPD*, results vary: ITV remains a significant predictor for one-year defaults (Specification 2), but its predictive power weakens for three-year defaults and credit rating downgrades (Specifications 4 and 6). This suggests that issuer term

[13] We create a rank-based opacity index (*IO*), like liquidity indices from prior studies (e.g., Butler et al. 2005). This index incorporates five common opacity measures: total bond amount outstanding, bond trading volume (a proxy for investors' disagreement on asset value as per Banerjee and Kremer 2010), bond bid-ask spreads, volatility of bond yield spreads, and dispersion in institutional investor portfolio weights (Nozawa et al. 2021).

[14] Previous literature shows that bonds from opaque firms often have varying credit ratings across agencies (e.g., S&P and Moody's) due to their increased analytical complexity (Morgan 2002; Livingston and Zhou 2010). Additionally, evaluating credit risk demands more resources, especially in uncertain economic conditions. The variability in bond terms further complicates this for investors with limited resources.

variability reflects a risk dimension not fully captured by credit ratings or issuer accounting and market data. This finding supports the risk channel although the exact causal mechanisms remain challenging to pinpoint.

[TABLE 4 HERE]

To further differentiate between the two channels, we examine if higher yield spreads from greater ITV lead to larger risk-adjusted returns. We conduct standard bond-level asset pricing tests, following Goldberg and Nozawa (2021). Specifically, we focus on the bond market factor (MKTB) and the liquidity risk factor (LRF) identified by Dickerson et al. (2023), estimating bond betas for each factor (*Beta_MKTB* and *Beta_LRF*) through the time-series regressions:

$$R^e{}_{k,t} = b_{0,k} + \beta_{k,MKTB} MKTB_t + \beta_{k,LRF} LRF_t + \varepsilon_{k,t} \qquad (3)$$

where $R^e{}_{k,t}$ is the excess return on bond *k*, calculated as its return minus the duration-matched Treasury return (van Binsbergen et al. 2023). *MKTB* and *LRF* are the bond market and liquidity risk factors, respectively. [15] Data is monthly, and we estimate Equation 3 using three-year rolling windows with at least 24 monthly observations.

To improve estimation precision for time-varying bond-level betas, we create 10 equally weighted portfolios based on each bond's pre-formation loadings from Equation 3. We then estimate the same time-series regression for each portfolio using its returns to obtain out-of-sample post-formation betas, which are assigned to the bonds in each portfolio. We use these post-formation betas in Fama–MacBeth cross-sectional regressions:[16]

$$R^e{}_{k,t+1} = \gamma_0 + \gamma_1 \beta_{k,MKTB} + \gamma_2 \beta_{k,LRF} + \gamma_3 ITV_{k,t} + \gamma_4 Controls_{k,t} + \mu_{k,t+1} \qquad (4)$$

where $ITV_{k,t}$ is the issuer term variability of bond *k*'s issuer, and $Controls_{k,t}$ is a vector of control variables for bond *k*, including is illiquidity (i.e., zero trading days), remaining time to maturity, and the (log) amount outstanding. We also include six rating dummies for AA, A, BBB, BB, B, and CCC and below.

[15] We thank Dickerson et al. (2023) for making the bond risk factor data publicly available at https://openbondassetpricing.com/.
[16] Following Dickerson et al. (2023), we estimate and report standard errors with a 12-lag Newey-West adjustment.

[TABLE 5 HERE]

The coefficient on ITV (γ_3) in Equation 4 indicates whether ITV is linked to returns higher than expected based on a bond's risks and liquidity. Panel B of Table 5 reports the results from the bond-level regressions. The findings show a significant negative association between *ITV* and bond returns after controlling for systematic risk exposure and other bond characteristics (Column 2 for Fama-MacBeth cross-sectional regression, and Column 4 for fixed-effect panel regression). Specifically, a one-SD increase in ITV is associated with lower risk-adjusted returns of about 17 bps and 32 bps per annum, respectively.

Next, we conduct a portfolio-based analysis (Panel A). This confirms that high ITV bonds have lower alphas. We sort bonds on ITV within credit ratings, create long-short portfolios (buying high ITV bonds and shorting low ITV bonds within the same rating), and regress their returns on two systematic risk factors. Long-short portfolio alphas are significantly negative, particularly for lower-rated bonds (-38 bps per annum for BBB and -215 bps for BB and below).

Lower alphas for high ITV bonds contradict the idea that these bonds offer a yield premium for costly analysis. Instead, they suggest a "reaching-for-yield" behavior, where investors seek higher yields in risky bonds at the expense of alpha. The is similar to the "betting-against-the-beta" strategy (Frazzini and Pedersen 2014) or "reaching-for-yield" approach. Chen and Choi (2023) show that reaching for yield predicts lower risk-adjusted returns due to buying pressure inflating valuations and reducing alphas.

To understand the link between risk-taking and compensation for risk, we examine whether higher yield spreads for greater ITV bonds compensate for their higher default rates, even though their negative alpha suggests they do not fully compensate for higher systematic risk. Our regressions, which include only ITV and credit rating dummies, show a negative association (Columns 1 and 3 of Panel B). This suggests that investors earn lower gross-of-risk expected returns by investing in high ITV bonds compared to similarly rated low ITV bonds. How do we interpret this behavior? Our results suggest either a lack of understanding of the risks or a strong preference for yield over returns, where investors accept lower returns in pursuit of higher yields. This will be discussed further in the next section.

3.2 Clientele Effects of Issuer Term Variability

So far, we have shown that issuer term variability affects bond yields and explored two possible explanations: costly analysis and greater issuer risk. We concluded that investors load up on high ITV bonds, even if these bonds have negative returns (both gross and risk-adjusted). This strategy reflects either investors' ignorance of risk or a deliberate decision to take on more risk than permitted by regulatory requirements or investment mandates in order to achieve better gross-of-risk performance. In this section, we focus on identifying bondholders to address this issue directly.

3.2.1 Issuer Term Variability and Reaching for Yield

It is well-documented that investors in corporate bond markets tend to favor higher-yielding assets within the same rating, a behavior known as 'Reaching-for-Yield (RFY)' (e.g., Becker and Ivashina 2015 for insurance companies; Choi and Kronlund 2018 for mutual funds). Therefore, if bonds from issuers with high ITV have higher yields than those of their peers with similar rating and maturity, they should appeal to RFY investors. In this section, we test this "clientele" effect at the issuer level (and at the investor level in the next section) by examining whether issuer term variability is positively associated with RFY ownership, i.e., the fraction of the bond held by RFY investors.

We first identify RFY investors as bond funds in eMAXX whose RFY values are in the top decile. RFY for a fund (${RFY^F}_{k,t}$) is calculated as the holding-weighted average of individual bond RFY ($RFY_{k,l,t}$), which is the difference between a bond's yield and the average yield of its benchmark bonds:

$$ {RFY^F}_{k,t} \equiv \sum_j w_{k,l,t} RFY_{k,l,t} = \sum_l w_{k,l,t} \left(y_{k,l,t} - {y_{k,l,t}}^{bc} \right), \qquad (5) $$

where $w_{k,l,t}$ is bond l's market weight in fund k's holdings for quarter *t*, $y_{k,l,t}$ is the yield of bond l held by fund k for quarter *t*, and ${y_{k,l,t}}^{bc}$ is the benchmark yield for bond l for quarter *t*. The benchmark yield is the value-weighted average yield of all index-eligible corporate bonds available during quarter t —specifically, all IG (or HY) bonds that meet the criteria for inclusion in the Barclays US Aggregate Bond Index (or

Barclays Corporate High Yield Index), and have the same rating and maturity as bond j (Choi and Kronlund 2018). A higher RFY^F indicates a fund's stronger tendency to reach for yield.

Next, we calculate RFY ownership ($RFY\_Own_{i,t}$) as the proportion of firm i's total bonds held by RFY funds. This is defined as the value-weighted average of the amounts of individual bonds held by RFY funds ($RFY\_Own_{i,j,t}$):

$$RFY\_Own_{i,t} \equiv \sum_j w_{i,j,t} RFY\_Own_{i,j,t} = \sum_j w_{i,j,t} \left(\frac{AMT\ held\ by\ RFY\ Funds}{AMT\ Outstanding}\right)_{i,j,t} \quad (6)$$

where $RFY\_Own_{i,t}$ is the bond holdings of firm i by RFY investors during quarter t, $w_{i,j,t}$ is the amount of bond j relative to the total amount of firm i's bonds, and $RFY\_Own_{i,j,t}$ is the amount of bond j held by RFY funds relative its total amount outstanding. A higher *RFY_Own* indicates that a firm has a larger base of yield-seeking investors. In our sample, *RFY_Own* has a mean of 9% and an SD of 14%.

We then regress RFY ownership on issuer term variability using a panel regression similar to Becker and Ivashina (2015). We cluster standard errors at both the firm and quarter levels and include fixed effects for either quarter or rating × quarter, depending on the specification:

$$RFY\_Own_{i,t} = a + b \times ITV_{i,t} + \boldsymbol{c} \times \sum Controls_{i,t} + \delta_t + \varepsilon_{i,t}. \quad (7)$$

The coefficient of interest is *b*, which we expect to be positive if issuer term variability attracts yield-reaching investors. Table 6 shows the regression results with either time-fixed effects (Specifications 1 to 5) or rating×time fixed effects (Specification 6). The coefficient *b* is positive and statistically significant across all specifications, indicating that bonds with higher issuer term variability are more likely to attract RFY investors. Specifically, with time-fixed effects, a one-SD increase in *ITV* is associated with about a 3-percentage point (11% of SD) increase in RFY ownership (Specification 1). Although the effect of *ITV* slightly decreases with the inclusion of bond rating and maturity as controls, it remains significant (Specification 2). The results are consistent even when accounting for other bond characteristics, such as bond illiquidity (Specification 3).

[TABLE 6 HERE]

We next address the possibility that RFY investors chase riskier bonds by including *Bond Number* as a distress cost proxy and *Zscore* and *EPD* as credit risk proxies (Specification 4). The result strengthens slightly, confirming the link between RFY and ITV. In Column 5, after controlling for bond yield, the result shows a significant positive link to RFY ownership, consistent with the reaching-for-yield phenomenon (e.g., Becker and Ivashina 2015). Although the effect of issuer term variability weakens as expected with the inclusion of yields, it remains statistically significant at the 10% level, suggesting that some RFY investors specifically target bonds with higher variability. This implies that fund managers may selectively invest in high-yielding bonds due to their complexity. Finally, including rating-fixed effects (Rating × Time) in Column 6 shows that the impact of ITV becomes even stronger. These results indicate that the preference for ITV reflects a distinct preference for bonds with higher variability, rather than merely a preference for credit ratings or issuer risk.

3.2.2 Economic Mechanism: Constrained Risk-Taking and Naïve Free-Lunch Hypotheses

We have provided evidence of a clientele effect at the issuer level, showing that RFY ownership is higher for bonds from issuers with greater ITV. Asset pricing tests reveal that both gross and risk-adjusted returns on high ITV bonds are lower than those on low ITV bonds, despite higher yield spreads. This indicates that higher yields do not adequately compensate for the increased default risk or systematic risk. We interpret this as consistent with both rational investors focusing solely on yields and irrational investors failing to accurately assess risk.

In this section, we attempt to distinguish between two motives for RFY investors reaching for ITV. We use detailed portfolio holdings and fund characteristics data from the CRSP Mutual Fund database. First, we confirm whether RFY funds tilt their portfolios toward high ITV bonds by estimating a panel regression at the fund-month level (Equation 7). We regress the fund's tendency to reach for ITV (RFV^F) on its tendency to reach for yield (RFY^F) along with other fund characteristics as controls. The regression includes both fund- and month-fixed effects, with standard errors clustered at the fund and month levels:

$$RFV^{F}{}_{i,t} = a + b \times RFY^{F}{}_{i,t} + \boldsymbol{c} \times \sum Controls_{i,t} + \alpha_i + \delta_t + \varepsilon_{i,t} \quad , \quad (8)$$

$RFV^{F}{}_{i,t}$ measures fund *i*'s tendency to reach for issuers with high ITV in quarter *t*, proxied by the holding-weighted average of bond-level *RFV*, calculated similarly to bond-level RFY. Specifically, bond-level *RFV* is the bond's *ITV* minus the average *ITV* of all index-eligible bonds with the same rating and maturity. As an alternative dependent variable, we use fund ITV (ITV^F), which is the weighted average ITV of the fund's bond holdings. $RFY^{F}{}_{i,t}$ is defined earlier in Equation 5 and measures the fund's tendency to reach for yield within rating and maturity. We also consider RFY^F_{total}, which uses as the benchmark all bonds regardless of rating and maturity. Fund control variables include fund age, size, and expense ratio.

[TABLE 7 HERE]

Panel A of Table 7 confirms that RFY and RFV are related. When using fund ITV (ITV^F) as the dependent variable, the coefficients on RFY^F_{total} and RFY^F are 0.007 and 0.002, with t-statistics of 6.06 and 2.23, respectively (Specifications 1 and 2). This indicates that a one-SD increase in RFY^F_{total} (1.33 percentage points) and RFY^F (0.62 percentage points) is associated with a 0.009 and 0.002 increase in fund ITV, respectively—20% and 5% of a SD. These results remain significant when we use fund RFV variables, RFV^F_{total} and RFV^F (Specifications 3 and 4). This confirms that RFY and RFV are related, supporting our earlier findings that investors who reach for yield also tend to reach for issuer term variability.

Having established the link between ITV and RFY investments, we now explore *why* RFY investors prefer high ITV bonds. We propose two competing hypotheses. First, investors constrained by regulatory capital requirements and investment mandates,[17] or those unable to leverage their positions adequately (Frazzini and Pedersen 2014), may seek higher returns than can be achieved by only fairly-priced bonds they are allowed. As a result, they load up on the riskiest bonds they are permitted to hold, which are often overpriced but may still offer high gross-of-risk expected returns (the constrained risk-taking story).

[17] For example, Becker and Ivashina (2005) find that insurance companies hold higher-yielding bonds within the same rating class due to regulatory capital requirements. Similarly, mutual funds, constrained by investment mandates though less strictly than insurers, also tend to seek higher yields (e.g., Choi and Kronlund 2018).

Second, some fund managers may be naïve and fail to understand that the higher yields on ITV bonds compensate for risks not reflected in credit ratings. They might mistakenly believe they are getting a "free lunch" by investing in these bonds.[18] In reality, the risks not captured by credit ratings may be related to the issuer's bond term variability. Consequently, rating-focused naïve investors who seek higher yields may end up holding high ITV bonds without fully understanding the associated risks, even if they have no portfolio constraints (the naïve free-lunch story).[19]

To distinguish between these two hypotheses, we analyze investment-grade (IG) funds—those restricted to IG bonds by their mandates.[20] We examine whether the fund's RFY or RFV correlates with the proportion of BBB-rated bonds in its portfolio ($FHOLD^{BBB}$). If RFY or RFV is driven by risk-taking to bypass constraints, we would expect a positive correlation. This is because focusing on fairly-priced BBB bonds would be a better strategy than chasing higher yields in A or AA bonds, which may underperform. Our results in Panel B of Table 7 are mixed: RFV shows a negative and insignificant correlation (Columns 4 to 6) while RFY shows a significantly positive correlation (Columns 1 to 3).[21] This suggests that RFY and RFV are related but distinct, and the RFV results are hard to reconcile with rational behavior among portfolio-constrained bond investors.

Overall, while our tests do not fully distinguish between the two motives for reaching for yield through ITV, the results in Panel B of Table 7 and Table 5 are inconsistent with the constrained risk-taking hypothesis. Instead, they suggest the alternative narrative, where naïve, rating-focused investors irrationally chase high ITV bonds for their higher yields, despite similar ratings.

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[18] This investor preference aligns with the salience bias in consumer choice (Bordalo et al. 2012). It also matches anecdotal evidence from the 2008/09 financial crisis, where investors (both institutional and retail) were misled by credit ratings and ended up investing in complex subprime mortgage-backed securities without fully understanding the associated risks (e.g., Griffin 2021).

[19] We thank the referee for this suggestion.

[20] We thank Baghai et al. (2023) for making their data on fixed income fund investment mandates publicly available. Based on this, we identified funds with an investment-grade (IG) mandate, as those where the mandate includes terms like "investment grade" and where IG bond holdings exceed 80%.

[21] We acknowledge that positive regression coefficients in our tests do not completely rule out irrationality. Rational IG bond fund managers seeking higher risk would avoid bonds with negative alpha unless they have exhausted their ability to hold riskier bonds with non-negative alpha. Thus, finding that managers who reach for yield also tend to favor lower-rated bonds does not necessarily mean that they have fully utilized their capacity to hold riskier bonds with non-negative alpha.

4. Robustness Tests

We now conduct robustness tests. One concern is that our focus variable might be spuriously correlated with bond optionality, such as call, put and convertible options. To address this, we separate the embedded optionality from issuer term variability. Another concern is that our measure might reflect the average level of bond features rather than their variation. We address this by controlling for the number of bond features, using both linear controls and fixed effects.

4.1 Bond Optionality

Issuer term variability is based on indicator variables that count the number of embedded options and other contractual features (listed in the Appendix). While our measure captures the cross-bond standard deviation rather than just a simple count of options, the impact of these options on yields could be substantial enough to dominate yield spreads. To account for this, we take two approaches. First, we reconstruct the measure using bond features that exclude embedded options and evalulate its ability to explain yield spreads. Second, we retain the original measure but explicitly control for bond optionality in the baseline regression.[22]

[TABLE 8 HERE]

The results in Table 8 show that embedded options are not the main drivers of yield spread effects related to issuer term variability. In Panel A, our variability measure remains strongly explanatory even after adjusting for bond optionality. The coefficient on the measure excluding options (ITV_{net}) has similar economic magnitude and statistical significance to the original measure that includes options (*ITV*), as seen in Table 2. In Panel B, we present the results using the original measure (*ITV*) with an additional regressor: the proportion of a firm's bonds with embedded options, specifically *Call*, *Put*, and *Conversion* (Columns 1 to 3, respectively). Again, the ITV effect remains significant, regardless of the type of optionality controlled for.

[22] We acknowledge that this reduced-form analysis has limitations in assessing the effects of embedded options on yields, as it does not consider option valuation models, detailed terms, or all relevant inputs, such as time-varying volatilities. Despite this, our reduced-form estimation can still offer insights into whether our results mainly reflect the net effect of embedded options on yields.

Furthermore, a negative relationship between embedded options and yield spreads is observed for puts and conversions (Columns 2 and 3), consistent with theoretical expectations since these options benefit bondholders and typically result in lower spreads. Interestingly, a statistically insignificant negative association between callability and yield (Column 1) contradicts theoretical predictions and previous empirical findings. Callable bonds, which are theoretically valued less, are expected to have higher yields due to the issuer's ability to call them. However, empirical evidence at the bond level is mixed, making our firm-level findings novel.[23] Overall, these results alleviate concerns that net optionality significantly impacts the average yield differential observed in our baseline regression.

4.2 Bond Features: Variance or Mean Effects

With issuer term variability, our goal is to capture the relative complexity of bonds—specifically, the variation in bond characteristics across different bonds—rather than their absolute complexity, which refers to the number of features embedded in each bond. Consequently, issuer term variability might not directly correlate with the number of bond features; variability could be just as high or higher even if bonds have fewer but more diverse features. For example, consider two hypothetical firms: Firm A has two identical bonds with only one feature, while Firm B has two identical bonds with all possible features. Both firms would have a zero ITV, yet some might argue that Firm B's bonds are more complex due to the greater number of features.

To address this concern, we control for the sum of bond feature means (*BFeatureNum*—which is 1 for Firm A and 11 for Firm B in our example—in our regression analyses of yield spreads (Specifications 1 to 3 in Table 9) and RFY ownership (Specifications 4 to 6). We include *BFeatureNum* as a linear control (Columns 1 and 4) and as a fixed effect (Columns 2 and 5). The results consistently show that the significance of our main variable remains robust. In Columns 3 and 6, our findings hold even when

[23] Bond-level studies, such as Francis et al. (2010) and Qiu and Yu (2009), find a significant positive association between callable bonds and yields. However, Qi et al. (2010) and Ball et al. (2018) report mixed results, with significance in some models but insignificance when accounting for other bond characteristics. To our knowledge, no study has used callable dummies in a firm-level regression.

including bond number fixed effects to account for any nonlinear relationship between issuer term variability and the number of outstanding bonds.

Conclusion

We examine how variations in contractual terms across bonds issued by a single firm—referred to as "issuer term variability" (ITV)—affect bond yield spreads, returns, and the investor base. Our findings show that firms with greater variability in their bond terms tend to have bonds with higher yield spreads but lower risk-adjusted returns. Notably, we observe that investors who reach for yield (RFY) also tend to favor bonds with higher ITV, a behavior we refer to as reaching for ITV (RFV).

Issuer term variability may be associated with higher yields due to the complexity and uncertainty it introduces. Evaluating a firm's bonds becomes more challenging with higher ITV, creating uncertainty about future payoffs and increasing the cost of bond analysis. Alternatively, or in addition, ITV may correlate with greater issuer risk: since investors cannot easily gauge the true risk of an issuer with high ITV, they demand higher compensation for the potential adverse selection. Our finding that bonds with high ITV yield lower risk-adjusted returns compared to those with low ITV suggests that the higher yield spreads on these bonds are not due to an information-analysis premium. Instead, they align with the behavior of yield-chasing investors who are drawn to high ITV bonds.

The lower gross returns on high ITV bonds are consistent with both irrational behavior—where investors fail to properly assess the risk—and rational behavior, where investors prioritize yield over returns to take on more risk within certain constraints. Further tests provide evidence that while RFV and RFY are related, they are distinct phenomena, and unlike generic RFY, RFV is harder to justify as a rational investment strategy.

Our paper has important implications for understanding the RFY phenomenon in the fixed income market, suggesting that it is not solely driven by higher yields in general but is more selectively influenced by specific sources of risk, such as issuer term variability. This intriguing area of research warrants further exploration.

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Appendix: Measures of Issuer Term Variability

We start by constructing a vector of bond features. First, we identify a firm's outstanding bonds—those that are issued but not yet matured or redeemed early)—using the "AMOUNT_OUTSTANDING" table from Mergent FISD. We then record each bond's contractual terms from the "ISSUE" table in FISD. Using this information, we create a dummy variable, $\mathbb{I}_k$, for each bond contractual feature k ($= 1\ to\ K$):

$$\mathbb{I}_k = \begin{cases} 1 & if \text{ bond contractual feature k is present/applicable} \\ 0 & if \text{ bond contractual feature k is absent/not applicable} \end{cases} \quad \text{(A. 1)}$$

where

$$k \in \{redeem, call, put, exch, conv, cov, enh, sec, short, fore, nfix\}$$

k refers to each of the K major categories of bond contractual features from FISD.

For example, we classify bonds as (*redeem*)*able*, (*call*)*able*, (*put*)*able*, (*exch*)*angeable*, or (*conv*)*ertible*.[24] If a bond is callable, the indicator variable, $\mathbb{I}_{call}$, equals 1; otherwise, it is 0. Similar definitions apply to the other four variables. We also track the presence of bond (*cov)enants* across 15 categories as per Billett et al. (2007), where $\mathbb{I}_{cov}$ equals 1 if a covenant is present in the bond's indenture and 0 if not. We also check for *credit (enh)ancements* (e.g., guarantees, letters of credit) with $\mathbb{I}_{enh} = 1$. Additionally, we consider four other bond features: $\mathbb{I}_{sec} = 1$ for senior secured bonds, $\mathbb{I}_{short} = 1$ for bonds with remaining maturities under five years, $\mathbb{I}_{fore} = 1$ if US dollar-denominated bonds, and $\mathbb{I}_{nfix} = 1$ for bonds with variable coupons.

With these eleven bond characteristics, we can represent bond j of a firm with N outstanding bonds as a K-dimensional bond feature vector ($1 \times K$),

$$\overrightarrow{\boldsymbol{b_j}} = (\mathbb{I}_{j1,}\ \mathbb{I}_{j2}, \cdots,\ \mathbb{I}_{jK}), \qquad j \in \{1,2, \cdots, N\},\ \ K = 11 \quad \text{(A.2)}$$

[24] The redeemable and callable flags in Mergent FISD overlap but are not the same: "redeemable" refers to bonds that can be redeemed under specific condition or at a particular time, while "callable" refers to bonds that can be called at any time within a prespecified period.

where $\mathbb{I}_{jk} \in \{0,1\}$ is the indicator for a bond's contractual feature. To measure the (pairwise) dissimilarity between two bond issues, i and j, we compute the squared Euclidean distance between their bond feature vectors, $\overrightarrow{\boldsymbol{b_i}}$ and $\overrightarrow{\boldsymbol{b_j}}$:

$$BDist_{i,j}{}^2 = \left\|\overrightarrow{\boldsymbol{b_i}} - \overrightarrow{\boldsymbol{b_j}}\right\|^2 = \sum_{k=1}^{K}\left(\mathbb{I}_{ik} - \mathbb{I}_{jk}\right)^2, \qquad i,j \in \{1,2,\cdots,N\}. \quad (\text{A}.3)$$

Next, we calculate the sum of pairwise bond distances for all pairs ($N \times N$). This can be simplified algebraically by computing the sum of distances between each bond and the firm's "average" bond:

$$\sum_{i,j\in\{1,\ldots,N\}} BDist_{i,j}{}^2 = \sum_{i,j\in\{1,\ldots,N\}} \sum_{k=1}^{K}\left(\mathbb{I}_{ik} - \mathbb{I}_{jk}\right)^2$$

$$= 2N \times \sum_{j=1}^{N}\left\|\overrightarrow{\boldsymbol{b_j}} - \overrightarrow{\boldsymbol{\mu}}\right\|^2 = 2N \times \sum_{j=1}^{N}\sum_{k=1}^{K}\left(\mathbb{I}_{jk} - \mu_k\right)^2 \quad (\text{A}.4).$$

The average bond, denoted by $\overrightarrow{\boldsymbol{\mu}} = (\mu_1, \mu_2, \cdots, \mu_K)$ where $\mu_k = \sum_{j=1}^{N} \omega_j \mathbb{I}_{jk}$, $k \in \{1,2,\cdots,K\}$ and ω_j is the fraction of j^{th} bond, serves as the centroid of the firm's bond vectors. To account for the number of bonds, we divide the both sides of Equation A.4 by N^2 (the number of possible bond pairs) before taking the square root:

$$\sqrt{\frac{\sum_{i,j\in\{1,\ldots,N\}} BDist_{i,j}{}^2}{N^2}} = \sqrt{\frac{2 \times \sum_{j=1}^{N}\sum_{k=1}^{K}\left(\mathbb{I}_{jk} - \mu_k\right)^2}{N}} \quad (\text{A}.5)$$

Finally, we compute issuer term variability (*ITV*) by multiplying Equation A.5 by $\sqrt{2/K}$, normalizing it to range from zero to one:

$$ITV \equiv 2 \times \sqrt{\frac{\sum_{j=1}^{N}\sum_{k=1}^{K}\left(\mathbb{I}_{jk} - \mu_k\right)^2}{N \times K}} \quad (\text{A}.6)$$

We also calculate issuer term variability relative to the market (ITV^{mkt}):

$$ITV^{mkt} \equiv 2 \times \sqrt{\frac{\sum_{j=1}^{N}\sum_{k=1}^{K}\left(\mathbb{I}_{jk} - \mu^{mkt}{}_k\right)^2}{N \times K}} \quad (\text{A}.7)$$

Where $\mu^{mkt}{}_k = \sum_{j=1}^{M} \omega_j \mathbb{I}^{mkt}{}_{jk}$, $k \in \{1,2,\cdots,K\}$, where $\mu^{mkt}{}_k$ is the sample (value-weighted) average of bond feature indicators of all M bonds in the market that match bond *j* by issuance year, maturity, and current credit rating. ω_j is the fraction of *j*th bond relative to the total amount of M bonds in the market.

An issuer term variability of 0 indicates minimum variability, either due to having only a single bond or having multiple bonds with identical contractual terms across bonds. A larger positive value indicates greater variability in a firm's bond issues.

We also consider *Cosine* distance as an alternative measure of bond term variability. The cosine distance between two bond vectors, $\overrightarrow{\boldsymbol{b_i}}$ and $\overrightarrow{\boldsymbol{b_j}}$ is calculated as 1 minus cosine similarity:

$$CosDist_{i,j} = 1 - \frac{\overrightarrow{b_i} \cdot \overrightarrow{b_j}}{\|\overrightarrow{b_i}\| \|\overrightarrow{b_j}\|}, \ i,j \in \{1,2,\cdots,N\} \qquad \text{(A.8)}$$

where $\|\overrightarrow{\boldsymbol{b_i}}\|$ is the length of vector $\overrightarrow{\boldsymbol{b_i}}$ (i.e., Euclidean distance from vector $\overrightarrow{\boldsymbol{b_i}}$ to zero vector $\vec{0}$). The cosine similarity in the second term of Equation A.6 measures the cosine of the angle between two vectors, ranging from 0 to 1. Since bond feature vectors are non-negative, the cosine distance ($CosDist_{i,j}$) also ranges from 0 to 1, where 0 indicates identical vectors and 1 indicates maximal dissimilarity. As with the Euclidean measure, we use the mean cosine distance of bonds from their "average" bond in order to define issuer term variability (ITV^c):

$$\frac{\sum_{j=1}^{N} CosDist_{j,\mu}}{N} = \frac{1}{N} \times \sum_{j=1}^{N} \left(1 - \frac{\overrightarrow{b_j} \cdot \vec{\mu}}{\|\overrightarrow{b_j}\| \|\vec{\mu}\|}\right) \equiv ITV^c \qquad \text{(A.9)}$$

The average bond, which is $\vec{\mu} = (\mu_1, \mu_2, \cdots, \mu_K)$ where $\mu_k = \frac{\sum_{j=1}^{N} \mathbb{I}_{jk}}{N}$, $k \in \{1,2,\cdots,K\}$, serves as the centroid of the firm's bond vectors. Issuer term variability based on cosine distance (ITV^c) ranges from 0 to 1, where 1 indicates maximum variability and 0 indicates minimum variability.

Table 1. Descriptive Statistics

This table presents summary statistics for the main variables in the sample, which includes all corporate bonds (excluding financial and utility firms) from the Mergent FISD database over a 20-year period from 1998Q2 to 2018Q1. *YS* is the value-weighted average yield spreads (in percentages) of a firm's outstanding bonds, calculated as the difference between the bond's yield to maturity and that of a Treasury bond with the same maturity. *Abn_YS* is the abnormal bond yield, computed as the value-weighted average of a bond's yield minus the average yield of benchmark bonds matched by rating, maturity, and liquidity. *ITV* (and ITV^{mkt}) is a firm-level measure of issuer term variability, capturing how a bond's terms differ from those of other bonds issued by the same firm (or from market norms) in non-financial terms (see Appendix for details). *Rating* is the value-weighted average of the firm's bond credit ratings, with numerical values assigned to rating notches from 1 (AAA) to 21 (C). *Illiquidity* is the value-weighted average of a bond's illiquidity as per Amihud (2002), and *Maturity* is the value-weighted average of the remaining years to maturity for the firm's bonds. *Bond Age* and *Bond Size* are the age of the bond and its (log) offering amount in thousands, respectively. *Bond Number* is the (log) count of the firm's outstanding bond issues. *Zscore* is Altman's (1968) Z-score, and *EPD* is Merton's (1974) expected probability of default. *RFY_Own* is the proportion of the bond amount held by RFY bond funds, defined as those funds in the top decile for *RFY* value. All variables are winsorized at the 1% level.

Panel A Summary Statistics of Main Variables

	N	MEAN	SD	P5	P95
YS	61,192	4.00	5.05	0.40	11.77
ITV	61,192	0.40	0.24	0.00	0.67
Rating	61,192	11.04	4.04	5.00	17.00
Maturity	61,192	7.91	4.75	2.35	17.82
Illiquidity	61,192	0.14	0.19	0.00	0.55
Bond Age	61,192	3.98	3.41	0.43	11.35
Bond Size	61,192	12.89	0.61	11.92	13.98
Bond Number	61,192	1.33	0.82	0.00	2.77
Zscore	41,698	1.57	1.49	-0.48	4.25
EPD	44,456	0.13	0.28	0.00	0.94
ITV^{mkt}	61,192	0.57	0.13	0.36	0.80
RFY_Own	60,700	0.09	0.14	0.00	0.39
$Default_1$	61,192	0.01	0.11	0.00	0.00
$Default_3$	61,192	0.04	0.20	0.00	0.00
$Downgrade_1$	61,192	0.15	0.35	0.00	1.00

Panel B Correlation Between Main Variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	*ITV*	1									
(2)	*Rating*	0.40***	1								
(3)	*Maturity*	-0.13***	-0.27***	1							
(4)	*Illiquidity*	-0.10***	0.06*	0.09***	1						
(5)	*Bond Age*	-0.26***	-0.34***	0.21***	0.37***	1					
(6)	*Bond Size*	-0.06**	-0.31***	0.12***	-0.23***	-0.14***	1				
(7)	*Bond Number*	0.50***	-0.18***	0.15***	-0.09***	-0.03	0.30***	1			
(8)	*Zscore*	-0.24***	-0.51***	0.14***	-0.08**	0.04	0.05	-0.02	1		
(9)	*EPD*	0.16***	0.39***	-0.16***	0.10***	-0.11***	0.00	-0.04	-0.47***	1	
(10)	ITV^{mkt}	0.27***	0.45***	-0.34***	-0.03	-0.23***	-0.27***	-0.10***	-0.24***	0.15***	1

Table 2. ITV and Bond Yield Spreads

This table presents the results of panel regressions where yield spreads are regressed on bond issuer term variability and other control variables. The sample is at the firm-quarter level and covers the period from 1998Q2 to 2018Q1. *YS* is the value-weighted average yield spreads (in percentages) of a firm's outstanding bonds, calculated as the difference between the bond's yield to maturity and that of a Treasury bond with the same maturity. *Abn_YS* is the abnormal bond yield, computed as the value-weighted average of a bond's yield minus the average yield of benchmark bonds matched by rating, maturity, and liquidity. *ITV* (and ITV^{mkt}) is a firm-level measure of issuer term variability, capturing how a bond's terms differ from those of other bonds issued by the same firm (or from market norms) (see Appendix for details). *Rating* is the value-weighted average of the firm's bond credit ratings, with numerical values assigned to rating notches from 1 (AAA) to 21 (C). *Illiquidity* is the value-weighted average of a bond's illiquidity as per Amihud (2002), and *Maturity* is the value-weighted average of the remaining years to maturity for the firm's bonds. *Bond Age* and *Bond Size* are the age of the bond and its (log) offering amount in thousands, respectively. *Bond Number* is the (log) count of the firm's outstanding bond issues. *Zscore* is Altman's (1968) Z-score, and *EPD* is Merton's (1974) expected probability of default. *t*-statistics are reported in parentheses. Both firm and quarter fixed effects are included, with standard errors clustered at the firm and quarter levels. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dep. Var.	Bond Yield Spreads (*YS*)					Abnormal Yields (*Abn_YS*)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ITV	1.19***	0.54**	0.65***	0.63**	0.62**	0.01**
	(4.58)	(2.17)	(2.70)	(2.41)	(2.40)	(2.36)
Rating		0.69***	0.66***	0.44***	0.44***	-0.00***
		(12.59)	(12.97)	(10.93)	(10.87)	(-6.94)
Maturity			-0.12***	-0.11***	-0.11***	-0.00***
			(-9.74)	(-8.55)	(-8.63)	(-2.70)
Illiquidity			3.00***	1.71***	1.72***	0.01***
			(7.58)	(4.85)	(4.85)	(4.32)
Bond Age			0.07***	0.02	0.02	0.00
			(4.16)	(1.30)	(1.32)	(0.81)
Bond Size			0.14	-0.15	-0.15	0.00
			(1.16)	(-1.27)	(-1.26)	(0.89)
Bond Number				-0.07	-0.07	0.00
				(-0.84)	(-0.83)	(0.03)
Zscore				-0.37***	-0.37***	-0.00***
				(-5.65)	(-5.66)	(-5.05)
EPD				3.95***	3.95***	0.02***
				(12.08)	(12.08)	(7.82)
ITV^{mkt}					0.16	0.00
					(0.35)	(0.65)
Constant	3.51***	-3.84***	-5.07***	1.03	0.93	0.01
	(33.89)	(-6.03)	(-2.86)	(0.64)	(0.58)	(0.99)
Observations	60,874	60,874	60,874	39,638	39,638	39,638
R-squared	0.640	0.673	0.688	0.718	0.718	0.360
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Double-Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes

Table 3. ITV and Information Uncertainty

This table presents the results of panel regressions examining how information uncertainty moderates the relationship between issuer term variability and yield spreads. The sample is at the firm-quarter level and covers the period from 1998Q2 to 2018Q1. *YS* is the value-weighted average yield spreads (in percentages) of a firm's outstanding bonds, calculated as the difference between the bond's yield to maturity and that of a Treasury bond with the same maturity. *ITV* is a firm-level measure of issuer term variability, capturing how a bond's terms differ from those of other bonds issued by the same firm (see Appendix for details). *H_IO* is a dummy variable indicating firms in the top tercile of the information opacity index, and *H_VIX* is a dummy variable indicating quarters in the top tercile of the VIX. *Rating* is the value-weighted average of the firm's bond credit ratings, with numerical values assigned to rating notches from 1 (AAA) to 21 (C). *Illiquidity* is the value-weighted average of a bond's illiquidity as per Amihud (2002), and *Maturity* is the value-weighted average of the remaining years to maturity for the firm's bonds. *Bond Number* is the (log) count of the firm's outstanding bond issues. *Zscore* is Altman's (1968) Z-score, and *EPD* is Merton's (1974) expected probability of default. *t*-statistics are reported in parentheses. Both firm and quarter fixed effects are included, with standard errors clustered at the firm and quarter levels. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dep. Var.	Bond Yield Spreads (*YS*)					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
H_IO × *H_VIX* × *ITV*					1.81***	1.43**
					(2.83)	(2.14)
H_IO × *ITV*	1.97***	1.10***			1.16***	0.50**
	(6.29)	(3.78)			(4.29)	(2.02)
H_VIX × *ITV*			2.07***	1.15***	1.68***	0.76***
			(4.31)	(3.65)	(4.62)	(3.64)
H_VIX × *H_IO*					0.91***	0.33*
					(3.36)	(1.84)
H_IO	0.24**	0.07				
	(2.27)	(0.72)				
ITV	-0.11	0.25	-0.35	0.20	-0.61**	0.02
	(-0.42)	(0.91)	(-1.30)	(0.75)	(-2.14)	(0.08)
Rating	0.70***	0.47***	0.69***	0.45***	0.70***	0.47***
	(12.02)	(9.76)	(12.69)	(11.10)	(11.90)	(9.74)
Maturity	-0.13***	-0.12***	-0.12***	-0.11***	-0.13***	-0.12***
	(-9.49)	(-8.40)	(-10.11)	(-8.90)	(-9.58)	(-8.40)
Illiquidity		1.99***		1.76***		1.96***
		(5.32)		(5.05)		(5.30)
Bond Number		-0.12		-0.11		-0.12
		(-1.49)		(-1.50)		(-1.52)
Zscore		-0.44***		-0.37***		-0.44***
		(-5.32)		(-5.62)		(-5.43)
EPD		4.35***		3.92***		4.21***
		(11.77)		(12.16)		(12.04)
Constant	-2.96***	-0.89*	-2.79***	-0.80*	-3.01***	-0.91*
	(-4.63)	(-1.67)	(-4.87)	(-1.80)	(-4.79)	(-1.73)
Observations	43,900	29,513	60,874	39,638	43,900	29,513
R-squared	0.697	0.742	0.680	0.719	0.704	0.745
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE (Firm and Time)	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. ITV and Bond Defaults

This table presents the results of panel regressions examining whether ITV predicts bond defaults and rating downgrades. The sample is at the firm-quarter level and covers the period from 1998Q2 to 2018Q1. $Default_1$ ($Default_3$) is a dummy variable indicating a bond default within the next year (three years). $Downgrade_1$ is a dummy variable indicating a bond's credit rating downgrade within the next year. *ITV* is a firm-level measure of issuer term variability, capturing how a bond's terms differ from those of other bonds issued by the same firm (see Appendix for details). *Rating* is the value-weighted average of the firm's bond credit ratings, with numerical values assigned to rating notches from 1 (AAA) to 21 (C). *Illiquidity* is the value-weighted average of a bond's illiquidity as per Amihud (2002), and *Maturity* is the value-weighted average of the remaining years to maturity for the firm's bonds. *Bond Number* is the (log) count of the firm's outstanding bond issues. *Zscore* is Altman's (1968) Z-score, and *EPD* is Merton's (1974) expected probability of default. *t*-statistics are reported in parentheses. Both firm and quarter fixed effects are included, with standard errors clustered at the firm and quarter levels. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dep. Var.	$Default_1$		$Default_3$		$Downgade_1$	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ITV	0.02***	0.01**	0.04***	0.03*	0.05**	0.00
	(3.90)	(2.29)	(3.32)	(1.89)	(2.16)	(0.07)
Rating	0.01***	0.01***	0.02***	0.01***	-0.05***	-0.06***
	(7.11)	(4.83)	(7.05)	(5.44)	(-15.51)	(-15.52)
Maturity	-0.00***	-0.00***	-0.00***	-0.00***	-0.00	-0.00
	(-5.03)	(-4.81)	(-4.45)	(-4.91)	(-0.48)	(-0.21)
Illiquidity	0.04***	0.02***	0.05***	0.04***	0.02*	0.00
	(5.18)	(3.03)	(4.63)	(3.79)	(1.94)	(0.29)
Bond Number		0.00		-0.00		0.01
		(0.92)		(-0.13)		(0.59)
Zscore		-0.00***		-0.01***		-0.05***
		(-3.13)		(-3.20)		(-8.10)
EPD		0.05***		0.07***		0.20***
		(6.49)		(5.76)		(10.53)
Constant	-0.08***	-0.05***	-0.14***	-0.09***	0.64***	0.86***
	(-6.25)	(-4.00)	(-5.63)	(-3.85)	(18.69)	(17.55)
Observations	60,874	39,638	60,874	39,638	60,874	39,638
R-squared	0.299	0.297	0.565	0.567	0.218	0.246
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE (Firm and Time)	Yes	Yes	Yes	Yes	Yes	Yes

Table 5. ITV and Bond Returns

This table presents the results of asset pricing tests on bond returns using bond-month level data from May 2005 to May 2018. Panel A reports average excess returns and alphas for portfolios sorted on ITV within similar rating categories. Bonds are grouped into ITV terciles within high, mid, and low rating categories at the end of each month. These portfolios are held for three months, with a one-month gap after formation. Average monthly excess returns (raw returns minus duration-matched Treasury returns) are calculated, and alphas are estimated by regressing portfolio excess returns on the bond market factor (MKTB) and the liquidity risk factor (LRF) from Dickerson et al. (2023). t-statistics are reported in parentheses. Panel B presents bond-level asset pricing test results using Fama-MacBeth regressions (Columns 1 and 2) and fixed-effect panel regressions (Columns 3 and 4). Bond excess returns are regressed on lagged values of ITV, post-formation systematic risk loadings on MKTB and LRF (β_mktb, and β_lrf, respectively), and bond controls, including credit rating dummies, log(bond amount), and bond illiquidity (percentage of zero trading days per month). Ten equal-weighted portfolios are formed based on each bond's pre-formation loadings, and post-formation portfolio betas are assigned to each bond. *ITV* is a firm-level measure of issuer term variability, capturing how a bond's terms differ from those of other bonds issued by the same firm (see Appendix for details). *t*-statistics with 12-lag Newey-West adjustments are reported in parentheses (Columns 1 and 2). Columns 3 and 4 include firm and month fixed effects, with standard errors clustered at the month level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A Returns of ITV Portfolios

		ITV		
Rating		High	Low	High−Low
High (AAA/AA/A)	Excess Return	0.0670	0.0737	-0.0067
		(1.39)	(1.40)	(-0.59)
	Alpha	0.0449	0.0376	0.0073
		(0.95)	(0.73)	(0.70)
Mid (BBB)	Excess Return	0.1568*	0.1893**	-0.0325*
		(1.80)	(2.08)	(-1.83)
	Alpha	0.0818	0.1132	-0.0314*
		(0.98)	(1.30)	(-1.72)
Low (BB and below)	Excess Return	0.1872	0.3808*	-0.1936**
		(0.89)	(1.75)	(-2.27)
	Alpha	-0.0411	0.1380	-0.1790**
		(-0.21)	(0.68)	(-2.04)

Panel B Bond-Level Asset Pricing Tests

Dep. Var.	Bond Excess Return			
	Fama-MacBeth Regression with Newey SE		FE Panel Regression with Clustered SE	
	(1)	(2)	(3)	(4)
ITV	-0.07**	-0.06**	-0.08	-0.11**
	(-2.59)	(-2.34)	(-1.54)	(-2.04)
β_{mktb}		0.16		0.28***
		(1.48)		(5.21)
β_{lrf}		0.12		0.28***
		(1.24)		(4.36)
Constant	0.45*	0.40*	0.46	0.23
	(1.87)	(1.83)	(1.60)	(0.80)
Bond Controls	Yes	Yes	Yes	Yes
Observations	271,708	271,708	271,657	271,657
R-squared	0.23	0.25	0.37	0.37

Table 6. ITV and Reaching for Yield: Firm-Level Analysis

This table presents the results of panel regressions examining the relationship between issuer term variability and investors' reaching-for-yield. The sample is at the firm-quarter level and covers the period from 1998Q2 to 2018Q1. *RFY_Own* is the proportion of the bond amount held by RFY bond funds, defined as those funds whose *RFY* value is in the top decile. *ITV* is a firm-level measure of issuer term variability, capturing how a bond's terms differ from those of other bonds issued by the same firm (see Appendix for details). *Bond Yield* is the value-weighted average of a bond's yield-to-maturity. *Rating* is the value-weighted average of the firm's bond credit ratings, with numerical values assigned to rating notches from 1 (AAA) to 21 (C). *Illiquidity* is the value-weighted average of a bond's illiquidity as per Amihud (2002), and *Maturity* is the value-weighted average of the remaining years to maturity for the firm's bonds. *Bond Age* and *Bond Size* are the age of the bond and its (log) offering amount in thousands, respectively. *Bond Number* is the (log) count of the firm's outstanding bond issues. *Zscore* is Altman's (1968) Z-score, and *EPD* is Merton's (1974) expected probability of default. *t*-statistics are reported in parentheses. Quarter or rating times quarter fixed effects are included, with standard errors clustered at the firm and quarter levels. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dep. Var.	Bond Ownership by RFY Funds (*RFY_Own*)					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ITV	0.13***	0.03***	0.02***	0.04***	0.02***	0.03***
	(10.57)	(4.00)	(3.94)	(5.68)	(3.30)	(4.42)
Rating		0.02***	0.02***	0.01***	0.01***	
		(16.69)	(16.44)	(12.42)	(7.13)	
Maturity		-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
		(-7.75)	(-8.01)	(-6.12)	(-4.44)	(-5.30)
Illiquidity			0.03***	0.01**	-0.00	-0.00
			(3.68)	(2.07)	(-0.14)	(-0.29)
Bond Age			-0.00***	-0.00**	-0.00***	-0.00***
			(-2.73)	(-2.52)	(-3.58)	(-5.61)
Bond Size			-0.00	0.00	0.00	-0.00
			(-0.04)	(0.49)	(0.59)	(-1.32)
Bond Number				-0.01***	-0.01***	-0.01***
				(-4.90)	(-4.13)	(-5.51)
Zscore				-0.01***	-0.00***	-0.01***
				(-5.97)	(-4.06)	(-5.33)
EPD				0.06***	0.02**	0.00
				(7.14)	(2.51)	(0.56)
Bond Yield					1.01***	1.22***
					(7.11)	(7.79)
Constant	0.04***	-0.08***	-0.08*	-0.04	-0.06	0.08**
	(7.23)	(-7.44)	(-1.74)	(-1.07)	(-1.51)	(2.05)
Observations	60,700	60,700	60,700	39,450	34,841	32,564
R-squared	0.118	0.351	0.353	0.358	0.432	0.468
Fixed Effects	Quarter	Quarter	Quarter	Quarter	Quarter	Rating × Quarter
Clustered SE (Firm and Quarter)	Yes	Yes	Yes	Yes	Yes	Yes

Table 7. ITV and Reaching for Yield: Fund-Level Analysis

This table presents the results of fund-level panel regressions examining the relationship between issuer term variability and investors' reaching-for-yield. The sample is at the fund-month level and covers the period from September 2003 to March 2018. The sample includes only funds with mandates to invest solely in investment-grade (IG) bonds. $FHOLD^{BBB}$ is the percentage of a fund's BBB bond holdings relative to its total holdings. RFY^F and RFY^F_{total} are the fund's reaching-for-yield measure. RFY^F is calculated as the holding-weighted average of individual bond RFY, which is the difference between a bond's yield and the average yield of its benchmark bonds matching rating and maturity. RFY^F_{total} uses as the benchmark all bonds regardless of rating and maturity. ITV^F represents issuer term variability values of a fund's bonds. RFV^F and RFV^F_{total} are the measure of the fund's reaching-for-ITV. RFV^F is calculated as the holding-weighted average of bond-level RFV, i.e., a bond's ITV minus the average ITV of all index-eligible bonds with the same rating and maturity. RFV^F_{total} uses as the benchmark all bonds regardless of rating and maturity. *Fund Size* is the logarithm of total asset under management, *Fund Age* is the number of years since the fund was launched, and *Expense Ratio* is the proportion of assets used for fund operating expenses. *t*-statistics are in parentheses. Both fund and month fixed effects are included, with standard errors clustered at the fund and month levels. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A Reaching for Yield and Reaching for ITV

Dep. Var.	ITV^F		RFV^F_{total}	RFV^F
	Model 1	Model 2	Model 3	Model 4
RFY^F_{total}	0.007***		0.007***	
	(6.18)		(6.26)	
RFY^F		0.003**		0.003**
		(2.42)		(2.23)
Fund Size	0.004***	0.003**	0.004***	0.005***
	(2.77)	(2.36)	(2.78)	(3.55)
Fund Age	-0.004**	-0.003*	-0.004**	-0.005***
	(-2.08)	(-1.77)	(-2.04)	(-3.04)
Expense Ratio	0.065	0.138	0.050	0.531
	(0.10)	(0.20)	(0.08)	(0.79)
Constant	0.415***	0.422***	0.167***	0.120***
	(44.17)	(43.63)	(17.77)	(12.28)
Observations	57,147	57,147	57,147	57,130
R-squared	0.600	0.594	0.611	0.446
Fund FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Clustered SE (Fund and Month)	Yes	Yes	Yes	Yes

Panel B Reaching for ITV and IG Bond Fund Holding

Dep. Var.	*FHOLD*^{BBB}					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
RFY^{F}_{total}	0.062***	0.066***	0.064***			
	(7.29)	(7.34)	(6.82)			
RFV^{F}_{total}				-0.254	-0.239	-0.233
				(-1.07)	(-1.10)	(-1.33)
Fund Size	-0.009	-0.009	-0.027**	-0.002	-0.003	-0.034***
	(-1.41)	(-1.34)	(-2.35)	(-0.21)	(-0.44)	(-2.68)
Fund Age	0.025*	0.023*	0.023	0.022	0.024	0.030
	(1.95)	(1.74)	(1.17)	(1.42)	(1.50)	(1.57)
Expense Ratio	12.775**	12.980**	6.447	21.851***	23.419***	12.413
	(2.53)	(2.29)	(0.64)	(3.94)	(3.76)	(1.16)
Constant	0.618***	0.620***	0.775***	0.527***	0.518***	0.764***
	(12.78)	(12.15)	(7.71)	(8.51)	(8.44)	(6.84)
Observations	3,810	3,783	3,809	3,810	3,783	3,809
R-squared	0.309	0.344	0.775	0.154	0.207	0.749
Fund FE	No	No	Yes	No	No	Yes
Fund Style FE	No	Yes	No	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Double-Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8. Impact of Bond Optionality

This table presents the results of panel regressions that account for the effects of bond embedded options. *YS* is the value-weighted average of yield spreads for a firm's outstanding bonds, where the spread is the bond's yield to maturity minus that of a Treasury bond with the same maturity. *Abn_YS* is the abnormal bond yield, computed as the value-weighted average of a bond's yield minus the average yield of benchmark bonds matched by rating, maturity, and liquidity. ITV_{net} (ITV_{net}^{mkt}) measures issuer term variability at the firm level, capturing how a bond differs from other bonds of the same issuer (market norms) excluding bond optionality (see Appendix for details). *Call*, *Put* and *Conversion* represent the proportions of a firm's bonds with embedded call, put, and conversion options, respectively. *Rating* is the value-weighted average of the firm's bond credit ratings, with numerical values assigned to rating notches from 1 (AAA) to 21 (C). *Illiquidity* is the value-weighted average of a bond's illiquidity as per Amihud (2002), and *Maturity* is the value-weighted average of the remaining years to maturity for the firm's bonds. *Bond Number* is the (log) count of the firm's outstanding bond issues. *Zscore* is Altman's (1968) Z-score, and *EPD* is Merton's (1974) expected probability of default. *t*-statistics are reported in parentheses. Both firm and quarter fixed effects are included, with standard errors clustered at the firm and quarter levels. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A ITV Excluding Optionality

Dep. Var.	Bond Yield Spreads (*YS*)					Abnormal Yields (*Abn_YS*)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ITV_{net}	1.05***	0.44*	0.52**	0.65***	0.64***	0.01***
	(4.36)	(1.91)	(2.30)	(2.82)	(2.81)	(2.96)
Rating		0.69***	0.67***	0.45***	0.45***	-0.00***
		(12.58)	(13.10)	(11.00)	(10.93)	(-6.88)
Maturity			-0.13***	-0.11***	-0.11***	-0.00***
			(-10.19)	(-8.90)	(-8.97)	(-2.82)
Illiquidity			3.09***	1.76***	1.77***	0.01***
			(7.85)	(5.04)	(5.04)	(4.57)
Bond Number				-0.12	-0.12	-0.00
				(-1.64)	(-1.64)	(-0.48)
Zscore				-0.37***	-0.37***	-0.00***
				(-5.58)	(-5.58)	(-5.06)
EPD				3.95***	3.96***	0.02***
				(12.08)	(12.09)	(7.86)
ITV_{net}^{mkt}					0.27	0.01
					(0.59)	(1.53)
Constant	3.54***	-3.81***	-2.98***	-0.79*	-0.94*	0.02***
	(35.00)	(-6.02)	(-5.10)	(-1.75)	(-1.90)	(4.86)
Observations	60,874	60,874	60,874	39,638	39,638	39,638
R-squared	0.640	0.673	0.688	0.718	0.718	0.360
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Double-Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B Controlling for Optionality

Dep. Var.	Bond Yield Spreads (*YS*)		
	Model 1	Model 2	Model 3
ITV	0.64**	0.75***	0.75***
	(2.46)	(3.04)	(2.96)
Rating	0.45***	0.46***	0.47***
	(11.01)	(11.31)	(11.51)
Maturity	-0.11***	-0.10***	-0.10***
	(-8.79)	(-8.53)	(-8.72)
Illiquidity	1.76***	1.80***	1.79***
	(5.01)	(5.15)	(5.11)
Bond Number	-0.10	-0.21***	-0.17**
	(-1.42)	(-2.83)	(-2.30)
Zscore	-0.37***	-0.36***	-0.35***
	(-5.57)	(-5.50)	(-5.34)
EPD	3.95***	3.96***	3.98***
	(12.10)	(12.12)	(12.18)
ITV^{mkt}	0.10	-0.15	0.13
	(0.22)	(-0.33)	(0.29)
Call	-0.34		
	(-0.94)		
Put		-3.18***	
		(-7.06)	
Conversion			-2.11***
			(-4.38)
Constant	-0.59	-0.59	-0.87*
	(-0.99)	(-1.21)	(-1.80)
Observations	39,638	39,638	39,638
R-squared	0.718	0.720	0.720
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Double-Clustered SE	Yes	Yes	Yes

Table 9. Impact of Number of Bond Features

This table presents the results of panel regressions that account for the count of bond features. *YS* is the value-weighted average of yield spreads for a firm's outstanding bonds, where the spread is the bond's yield to maturity minus that of a Treasury bond with the same maturity. *RFY_Own* is the proportion of the bond amount held by RFY bond funds, defined as those funds whose *RFY* value is in the top decile. *BFeatureNum* is the sum of bond features of a firm's bonds. ITV_{net} (ITV_{net}^{mkt}) measures issuer term variability at the firm level, capturing how a bond differs from other bonds of the same issuer (market norms) excluding bond optionality (see Appendix for details). The same control variables are used for Columns 1 to 3 as those in Table 2, and for Columns 4 to 6 as those in Table 5. *t*-statistics are in parentheses. Different fixed effects are included for different model specifications, with standard errors clustered at the firm and quarter levels. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

Dep. Var.	Bond Yield Spreads (*YS*)			RFY Ownership (*RFY_Own*)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ITV	0.61**	0.99***	0.71***	0.02***	0.03***	0.03***
	(2.33)	(4.05)	(3.31)	(3.26)	(3.92)	(4.52)
ITV^{mkt}	0.19	0.38	0.78*	0.02*	0.01	0.02*
	(0.41)	(0.86)	(1.93)	(1.96)	(1.05)	(1.99)
BFeatureNum	-0.01			0.00		
	(-0.30)			(0.81)		
Constant	0.95	-0.05	0.24	-0.08*	-0.08*	-0.09**
	(0.59)	(-0.04)	(0.19)	(-1.90)	(-1.92)	(-2.05)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39,638	39,717	39,700	34,841	34,841	34,824
R-squared	0.718	0.543	0.543	0.433	0.434	0.436
Fixed Effects	Firm & Quarter	BFNum & Quarter	BNum & Quarter	Quarter	BFNum & Quarter	BNum & Quarter
Double-Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes