When Liquidity Dries Up: How Refinancing Pressure Shapes Corporate Bond Spreads

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Abstract

This study examines how refinancing pressure is reflected in corporate bond spreads and yields and whether its pricing varies with secondary-market liquidity. Using Thai corporate bond data from 2016 to 2025, the empirical analysis is based on 13,076 bond-month observations covering 129 issuers. The study distinguishes bond-level maturity exposure from issuer-level refinancing concentration. Trading liquidity is consistently associated with lower spreads and yields across all specifications. When estimated separately, bond-level maturity measures do not exhibit a consistent positive refinancing-risk premium. By contrast, issuer-level refinancing concentration is associated with wider spreads and higher yields under low-liquidity conditions, and this association weakens as trading liquidity improves. In the joint specifications, bond-level maturity measures retain incremental explanatory power after controlling for issuer-level concentration, indicating that the two levels capture distinct dimensions of refinancing pressure. Overall, the findings suggest that issuer-level maturity concentration provides the clearest measure of refinancing pressure, while bond-level maturity timing represents a complementary pricing channel. The results highlight issuer-level refinancing concentration as a useful indicator of financial vulnerability in emerging corporate bond markets.

Keywords: corporate bond spreads; market liquidity; rollover risk; refinancing risk; emerging markets

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Introduction

Corporate bond markets play a critical role in financing firms and allocating capital, particularly in emerging economies where bank-based financing is increasingly complemented by growing local-currency bond markets (Burger et al., 2012; Eichengreen & Luengnaruemitchai, 2004). Understanding the determinants of corporate bond spreads is therefore essential for both investors and policymakers. Two key factors that have received considerable attention in the literature are market liquidity and refinancing (rollover) risk. Liquidity affects trading costs, price efficiency, and yield spreads (Bao et al., 2011; Chen et al., 2007; Longstaff et al., 2005), while refinancing risk reflects the ability of firms to roll over maturing debt obligations (Diamond, 1991).

Despite extensive research, these two strands of literature have largely evolved separately. Existing studies typically examine liquidity risk and refinancing pressure as independent drivers of bond spreads (Dick-Nielsen et al., 2012; Friewald et al., 2012; Houweling et al., 2005; Longstaff et al., 2005). However, this approach may overlook an important interaction between the two. In particular, refinancing risk may not be uniformly priced across market conditions but instead become more relevant when liquidity is constrained. Moreover, most empirical studies rely on bond-level measures of maturity, implicitly assuming that refinancing risk is a bond-specific characteristic rather than a holistic corporate finance issue.

This study argues that issuer-level maturity concentration provides a more comprehensive measure of refinancing pressure than the maturity of an individual bond, while bond-level maturity timing may retain a distinct pricing effect. While individual bond maturity captures the timing of a single obligation, refinancing risk arises from the concentration of debt maturities across the issuer's entire liability structure (Almeida et al., 2012; Choi et al., 2018). As such, investors are more likely to assess refinancing pressure in aggregate rather than at the level of individual bonds. This perspective is consistent with theoretical work emphasizing firm-level rollover constraints and debt maturity structures (Diamond, 1991; Gopalan et al., 2014).

In addition, this study proposes that the pricing of refinancing risk is conditional on market liquidity. When secondary-market liquidity is strong, greater investor demand, market depth, and risk-bearing capacity may reduce the pricing

premium associated with concentrated refinancing obligations.

In contrast, when liquidity deteriorates, refinancing constraints become more binding, and investors demand higher compensation for exposure to concentrated maturities. This suggests a state-dependent pricing mechanism in which market liquidity interacts with funding liquidity, acting as a transmission channel for refinancing risk (Acharya et al., 2011; Brunnermeier & Pedersen, 2009; Friewald et al., 2012; He & Xiong, 2012).

To examine these issues, this paper uses bond-level data from the Thai corporate bond market over the period 2016-2025, providing a valuable testing ground given the rapid expansion of Asian corporate debt (Burger et al., 2012; Eichengreen & Luengnaruemitchai, 2004). The empirical strategy exploits variation in both liquidity conditions and maturity structure and employs fixed-effects regressions with interaction terms to identify how refinancing pressure is priced under different liquidity regimes. Refinancing risk is measured at both the bond level and the issuer level, allowing for a direct comparison of their explanatory power.

The results show that liquidity is a robust determinant of bond spreads across all specifications, aligning with broader findings in corporate debt markets. In contrast, bond-level measures of refinancing pressure do not exhibit consistent pricing effects. A clearer pattern emerges at the issuer level: refinancing concentration is positively associated with spreads, and its effect is significantly stronger when liquidity is low. This provides evidence that issuer-level refinancing concentration is liquidity-dependent, while bond-level maturity timing retains a distinct pricing role in the joint specifications.

This study makes three main contributions to the literature on corporate bond pricing and refinancing risk.

First, it provides new evidence that refinancing pressure is most clearly captured by issuer-level maturity concentration, while bond-level maturity measures retain incremental explanatory power in joint specifications. While traditional measures focus on individual bond maturity, the results show that such measures do not consistently explain variation in spreads. Instead, it is the concentration of maturities across an issuer's entire debt structure that is relevant for pricing.

Second, the study introduces a liquidity-conditioned framework for understanding refinancing risk. The findings show that refinancing pressure is not

priced unconditionally, but the pricing effect of issuer-level refinancing concentration varies systematically with secondary-market liquidity and weakens as trading liquidity improves. This highlights a state-dependent pricing relationship in which secondary-market liquidity conditions the association between refinancing concentration and bond spreads.

Third, the study contributes to the emerging market literature by providing evidence from the Thai corporate bond market using detailed bond-level data. The results demonstrate that monitoring issuer-level refinancing concentration can serve as an early warning signal of financial vulnerability, particularly in periods of market stress when refinancing constraints become binding.

The findings have important implications for investors and policymakers. Monitoring liquidity conditions alone may not be sufficient to assess bond market risk; instead, it is the interaction between liquidity and refinancing concentration that determines how risk is priced. In particular, periods of clustered debt maturities combined with declining liquidity may signal elevated vulnerability in corporate bond markets, especially in emerging economies where refinancing constraints can become binding more rapidly (Broner et al., 2013).

Literature Review and Hypothesis Development

Liquidity and Corporate Bond Pricing

The traditional view of corporate bond pricing is grounded in structural models in which yield spreads primarily compensate investors for expected default losses (Merton, 1974). However, a large empirical literature has shown that this framework alone cannot fully account for observed spreads. In particular, a substantial portion of corporate bond spreads reflects non-default components, most notably liquidity (Elton et al., 2001; Huang & Huang, 2012; Longstaff et al., 2005). This insight has reshaped the understanding of bond pricing, shifting attention toward market frictions as a central determinant of required returns.

Rather than being a passive trading cost, liquidity is now widely recognized as a systematic risk factor. Theoretical models emphasize that expected returns incorporate compensation for liquidity risk and its co-movement with market conditions (Acharya & Pedersen, 2005). In this setting, assets that become difficult to trade precisely when market liquidity deteriorates command higher risk premia. This perspective implies that liquidity is inherently state-dependent and closely tied

to broader market conditions.

Empirical evidence supports this view. Corporate bond markets are characterized by limited trading and periodic liquidity reductions, particularly during periods of market tension (Bao et al., 2011; Bessembinder et al., 2006; Dick-Nielsen et al., 2012). These dynamics are further reinforced by the over-the-counter structure of bond markets, where liquidity provision depends on dealer balance sheets and risk-bearing capacity (Adrian et al., 2017). As a result, liquidity conditions can deteriorate rapidly, leading to sharp increases in required yields.

These effects are likely to be more pronounced in emerging markets, where bond markets tend to be less liquid and more sensitive to shocks (Burger et al., 2012; Du & Schreger, 2016). In such environments, liquidity constraints are expected to play a central role in determining bond spreads. Consistent with this reasoning, higher market liquidity should reduce trading frictions and lower required returns. Therefore, we hypothesize as follows:

H1: Market liquidity is negatively associated with corporate bond spreads.

Debt Maturity Structure and Rollover Risk

Beyond liquidity, corporate finance research highlights the importance of debt maturity structure in shaping firm risk. Firms face a trade-off between short-term and long-term debt: while shorter maturities may reduce borrowing costs and agency problems, they expose firms to refinancing risk when obligations come due (Diamond, 1991).

Rollover risk arises from uncertainty regarding a firm's ability to refinance maturing debt. Unlike default risk, which reflects underlying solvency, refinancing risk depends critically on external financing conditions. As such, even fundamentally sound firms may face elevated risk if they are unable to access funding during adverse market conditions. Empirical evidence underscores the importance of this mechanism. Firms with large amounts of debt maturing during periods of stress experience significant real effects, particularly when refinancing conditions deteriorate (Almeida et al., 2012; Choi et al., 2018; Duchin et al., 2010).

However, the economic relevance of rollover risk is unlikely to be uniform across different levels of measurement. At the bond level, simple maturity-based indicators may not fully capture refinancing pressure, as individual bonds represent only a fraction of a firm's overall funding needs. In contrast, refinancing pressure

may be more meaningfully reflected at the issuer level, particularly when debt maturities are concentrated within a short time horizon. Such clustering, often referred to as a refinancing wall, can generate substantial funding pressure when multiple obligations must be rolled over simultaneously.

This distinction suggests that the pricing of rollover risk may depend on how refinancing pressure is measured. In particular, bond-level proxies may provide limited information about overall refinancing needs, whereas issuer-level measures may better capture aggregate funding pressure. Consequently, we propose the following hypothesis:

H2: Issuer-level refinancing concentration is positively associated with corporate bond spreads and provides a more direct measure of refinancing pressure than bond-level maturity exposure.

Liquidity–Rollover Interaction in Bond Pricing

While liquidity and rollover risk have been extensively studied, the interaction between these two mechanisms remains less clearly understood. Conceptually, liquidity conditions play a critical role in determining the ease with which firms can refinance maturing debt. When secondary-market liquidity is strong, greater market depth, investor demand, and risk-bearing capacity may reduce the premium associated with refinancing exposure. In contrast, when liquidity deteriorates, limited market depth may amplify investors' required compensation for maturity-related risk.

Theoretical models provide support for this interaction. In environments characterized by limited liquidity, shocks to funding conditions can trigger feedback effects between refinancing pressure and market liquidity, reinforcing credit risk (Brunnermeier & Pedersen, 2009; He & Milbradt, 2014; He & Xiong, 2012). Empirical evidence similarly suggests that the pricing of refinancing risk varies across liquidity conditions, with maturity-related risks becoming more salient when market liquidity is constrained (Becker & Ivashina, 2014; Mian & Santos, 2018).

However, the strength and consistency of this interaction may depend on the level at which refinancing pressure is measured. When refinancing needs are concentrated at the issuer level, liquidity constraints may have a more pronounced

effect, as firms compete for limited funding capacity. In contrast, bond-level maturity indicators may not fully capture these aggregate pressures, potentially weakening the observed interaction.

Building on this perspective, this study proposes a liquidity-adjusted view of rollover risk. Building on this perspective, this study proposes that the positive pricing effect of issuer-level refinancing concentration becomes stronger when secondary-market liquidity is limited. Accordingly, we propose the following hypothesis:

H3: Secondary-market liquidity weakens the positive association between issuer-level refinancing concentration and corporate bond spreads.

Data and Variables

Data Collection

This study employs a detailed bond-level dataset of Thai corporate bonds obtained from the iBond database provided by the Thai Bond Market Association (ThaiBMA). The iBond platform contains detailed information on bond characteristics, secondary market trading activity, and issuer-level attributes, making it well suited for analyzing liquidity conditions and refinancing risk in the Thai corporate bond market.

The sample period spans from 2016 to 2025 and initially includes all available corporate bond issues. To ensure comparability and economic relevance, several standard filters are applied. First, bonds issued by financial institutions are removed due to differences in regulatory environments, capital structures, and funding models. Second, observations missing the core variables required to construct monthly bond pricing, trading activity, and maturity measures are excluded. Missing Credit Rating observations are retained for the descriptive sample but excluded from the regression sample.

After applying the initial sample filters, the dataset contains 13,532 bond-month observations covering 129 issuers and 1,087 corporate bond issues, including both short- and long-term bonds. Credit-rating information is unavailable for 439 observations. The fixed-effects estimation subsequently removes 17 singleton observations, resulting in a final regression sample of 13,076 bond-month observations. The dataset includes detailed bond-level variables, including yield spreads, trading value, coupon rates, issue size, and time to maturity, as well as

issuer-level information used to construct measures of refinancing pressure.

A key feature of the dataset is the ability to link bond-level trading activity with issuer-level maturity structures. This enables the construction of multiple proxies for refinancing risk, including bond-level maturity exposure and issuer-level refinancing concentration. This distinction is central to the empirical design, as it allows for a direct comparison between bond-specific and aggregate (issuer-level) refinancing effects.

The use of monthly data further enables the analysis to capture time variation in both liquidity conditions and refinancing pressure. This is important given that liquidity in corporate bond markets is highly time-varying and often deteriorates during periods of market stress. Continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of extreme observations, following standard empirical practice in the literature (Bao et al., 2011; Brooks, 2019; Huber, 2009).

Variable Construction and Economic Interpretation

Bond Spread

The primary dependent variable is the corporate bond yield spread (Spread), obtained directly from the ThaiBMA iBond database and expressed in basis points. The measure represents the difference between the corporate bond yield and the Thai government bond yield corresponding to a comparable remaining maturity. Because Spread is sourced directly from iBond, the study does not independently construct or interpolate the government benchmark yield. Corporate bond spreads compensate investors not only for expected credit losses but also for liquidity conditions and other market frictions (Elton et al., 2001; Huang & Huang, 2012; Longstaff et al., 2005). Accordingly, Spread provides an appropriate pricing measure for examining how liquidity and refinancing pressure are reflected in required returns.

A large body of empirical evidence shows that corporate bond spreads incorporate not only credit risk but also liquidity premia and other market frictions (Elton et al., 2001; Huang & Huang, 2012; Longstaff et al., 2005). More recent studies further demonstrate that non-default components dominate credit spreads and vary systematically with macro-financial conditions (Collin-Dufresn et al., 2001; Feldhütter & Schaefer, 2018; Gilchrist & Zakrajšek, 2012). Accordingly, bond spreads provide a comprehensive measure for assessing how liquidity

conditions and refinancing pressure are priced in corporate bond markets.

Liquidity

Market liquidity is proxied by the natural logarithm of trading value. In over-the-counter corporate bond markets, direct measures such as bid–ask spreads are often limited or noisy. As a result, trading activity is widely used as a practical proxy for market depth and execution costs (Chen et al., 2007; Edwards et al., 2007; Friewald et al., 2012).

From a theoretical perspective, liquidity is a priced risk factor. In liquidity-adjusted asset pricing models, expected returns compensate investors for both the level of illiquidity and its systematic variation over time (Acharya & Pedersen, 2005). Empirical evidence consistently shows that lower liquidity is associated with higher yield spreads, reflecting trading frictions, dealer constraints, and market-making capacity (Adrian et al., 2017; Bao et al., 2011; Bessembinder et al., 2006; Dick-Nielsen et al., 2012).

Recent studies further highlight the importance of market structure and immediacy costs, showing that liquidity provision in corporate bond markets depends critically on dealer intermediation and trading relationships (Dick-Nielsen et al., 2012; Hendershott et al., 2020). During periods of stress, these frictions can intensify sharply, leading to significant liquidity deterioration (O'Hara & Zhou, 2021).

Rollover Risk (Bond-Level Refinancing Pressure)

Rollover risk is proxied using the inverse of time to maturity (1/TTM), capturing the increasing intensity of refinancing pressure as a bond approaches maturity. This specification reflects the nonlinear nature of maturity-related risk documented in the literature (Choi et al., 2018; He & Xiong, 2012). A near-maturity indicator is also included to capture discrete refinancing pressure effects.

Conceptually, rollover risk differs from default risk. While default risk reflects firm fundamentals, refinancing risk depends on access to external financing under prevailing market conditions (He & Xiong, 2012). This implies that rollover risk is inherently state-dependent and closely linked to credit market conditions.

However, bond-level maturity measures may not fully capture refinancing pressure. Since individual bonds represent only part of a firm’s liability structure, bond-level indicators may provide limited information about aggregate refinancing

needs.

Refinancing Wall (Issuer-Level Refinancing Pressure)

To capture aggregate refinancing pressure, the analysis constructs a refinancing wall ratio (RefWall). RefWall is defined as the ratio of the issuer's outstanding corporate bond principal maturing within one year to its total outstanding corporate bond principal. Outstanding amounts are measured at the bond level and aggregated to the issuer-month level. This measure reflects maturity concentration and captures situations in which firms face clustered refinancing obligations.

Issuer-level maturity concentration provides a more comprehensive measure of funding pressure. Firms with a large share of debt maturing in a short period are more exposed to refinancing shocks and changes in credit market conditions (Almeida et al., 2012; Choi et al., 2018; Gopalan et al., 2014; Harford et al., 2014). This is consistent with the view that refinancing constraints arise at the firm level rather than at the level of individual securities.

At the aggregate level, synchronized refinancing needs across firms may generate systemic funding pressure, particularly when market liquidity is limited (Acharya et al., 2011; He & Milbradt, 2014).

Liquidity–Rollover Interaction

To examine how refinancing pressure is priced under different market conditions, the empirical specification includes interaction terms between liquidity and refinancing measures.

The economic intuition is that the pricing of refinancing risk depends critically on market liquidity. When secondary-market liquidity is strong, greater market depth and investor risk-bearing capacity may reduce the premium associated with concentrated refinancing needs. In contrast, when liquidity deteriorates, investors may require greater compensation for exposure to refinancing concentration (Becker & Ivashina, 2014; Ivashina & Scharfstein, 2010; Mian & Santos, 2018).

This interaction is also consistent with broader evidence that credit supply and funding conditions tighten during periods of market stress, reinforcing the sensitivity of refinancing risk to liquidity conditions (Chen et al., 2021).

Control Variables

To isolate the effects of liquidity and refinancing pressure, the model includes a set of standard bond-level controls.

The coupon rate accounts for differences in contractual cash flows and investor demand, which may influence yield spreads (Elton et al., 2001). Issue size, measured in logarithmic form, captures bond marketability, as larger issues are typically more liquid and may carry lower liquidity premia (Bao et al., 2011; Bessembinder et al., 2006). Finally, time to maturity is included to control for duration and term structure effects, as longer maturities are generally associated with greater interest rate risk (Merton, 1974).

Model Specification

Empirical Framework

This empirical analysis examines whether refinancing pressure is reflected in corporate bond spreads and yields, and whether this relationship depends on secondary-market liquidity and on the level at which refinancing pressure is measured. Prior studies often treat liquidity and refinancing risk as separate determinants of bond pricing (Bao et al., 2011; Chen et al., 2007; Collin-Dufresn et al., 2001). Such a separation, however, may overlook an important dimension: refinancing pressure may not be uniformly priced, and its pricing may depend jointly on market conditions and on the level at which maturity structure is aggregated.

To disentangle these two channels, the analysis measures refinancing pressure at two distinct levels:

1. Bond level, captured by (i) Rollover Risk, defined as the inverse of time to maturity (1/TTM), and (ii) a Near-Maturity (<1Y) indicator identifying bonds approaching maturity within one year. TTM captures the approximately linear term-premium component, whereas 1/TTM captures the nonlinear acceleration of maturity pressure as a bond approaches maturity.

2. Issuer level, captured by a Refinancing Wall (RefWall) variable, defined as the share of an issuer's total outstanding debt maturing within one year.

Market liquidity, proxied by the logarithm of trading volue (ln(tv)), is incorporated both as a direct determinant of bond pricing and as a conditioning variable through interaction terms with each refinancing-pressure measure. These interactions

test whether the pricing effect of refinancing pressure varies with the depth and ease of secondary-market trading, rather than imposing a specific structural mechanism a priori.

Because bond maturities are fixed at issuance, they provide a source of variation in refinancing pressure that is plausibly predetermined and not driven by contemporaneous liquidity conditions (Almeida et al., 2012; Gopalan et al., 2014), which helps mitigate concerns about endogeneity between liquidity and bond pricing. All specifications include issuer fixed effects (μ_i) and year–month fixed effects (λ_t) to absorb unobserved issuer-level heterogeneity and common shocks affecting all bonds in a given period (Elton et al., 2001; Longstaff et al., 2005). Standard errors are clustered at the issuer level throughout.

Specifications

1. Baseline Near-Maturity

   $$Spread_{(i,t)} = \alpha + \beta_1 NearMat1Y_{(i,t)} + \beta_2 ln(tv)_{(i,t)} + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

2. Near-Maturity x Liquidity Interaction

   $$Spread_{(i,t)} = \alpha + \beta_1 NearMat1Y_{(i,t)} + \beta_2 ln(tv)_{(i,t)} + \beta_3 (NearMat1Y_{(i,t)} \times ln(tv)_{(i,t)}) + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

   Specifications (1) and (2) examine the relationship between near-maturity status and corporate bond spreads. Specification (1) estimates the baseline association, while Specification (2) introduces the interaction between NearMat1Y and ln(tv) to assess whether this association varies with secondary-market liquidity.

3. Baseline Rollover Risk

   $$Spread_{(i,t)} = \alpha + \beta_1 Rollover_{(i,t)} + \beta_2 ln(tv)_{(i,t)} + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

4. Rollover x Liquidity Interaction

   $$Spread_{(i,t)} = \alpha + \beta_1 Rollover_{(i,t)} + \beta_2 ln(tv)_{(i,t)} + \beta_3 (Rollover_{(i,t)} \times ln(tv)_{(i,t)}) + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

   Specifications (3) and (4) examine the relationship between continuous rollover pressure and corporate bond spreads. Specification (3) estimates the baseline association, while Specification (4) introduces the interaction between Rollover and ln(tv) to assess whether this association varies with

secondary-market liquidity. The interaction coefficient β_3 in Specifications (2) and (4) indicates whether the association between each bond-level refinancing measure and corporate bond spreads varies with secondary-market liquidity.

5. Baseline Refinancing Wall (issuer level)

$$Spread_{(i,t)} = \alpha + \beta_1 RefWall_{(i,t)} + \beta_2 ln(tv)_{(i,t)} + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

6. Refinancing Wall x Liquidity Interaction

$$Spread_{(i,t)} = \alpha + \beta_1 RefWall_{(i,t)} + \beta_2 ln(tv)_{(i,t)} + \beta_3 (RefWall_{(i,t)} \times ln(tv)_{(i,t)}) + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

Specifications (5) and (6) examine issuer-level refinancing concentration. Specification (5) estimates the baseline association between RefWall and corporate bond spreads, while Specification (6) introduces the interaction between RefWall and ln(tv) to assess whether this association varies with secondary-market liquidity.

7. Joint Model: Near-Maturity and Refinancing Wall

$$Spread_{(i,t)} = \alpha + \beta_1 NearMat1Y_{(i,t)} + \beta_2 RefWall_{(i,t)} + \beta_3 ln(tv)_{(i,t)} + \beta_4 (NearMat1Y_{(i,t)} \times ln(tv)_{(i,t)}) + \beta_5 (RefWall_{(i,t)} \times ln(tv)_{(i,t)}) + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

8. Joint Model: Rollover and Refinancing Wall

$$Spread_{(i,t)} = \alpha + \beta_1 Rollover_{(i,t)} + \beta_2 RefWall_{(i,t)} + \beta_3 ln(tv)_{(i,t)} + \beta_4 (Rollover_{(i,t)} \times ln(tv)_{(i,t)}) + \beta_5 (RefWall_{(i,t)} \times ln(tv)_{(i,t)}) + \gamma X_{(i,t)} + \mu_i + \lambda_t + \varepsilon_{(i,t)}$$

Specifications (7) and (8) jointly include bond-level and issuer-level refinancing measures. These specifications assess whether bond-specific maturity timing and issuer-level refinancing concentration retain distinct explanatory power after controlling for one another and whether their respective associations with corporate bond spreads vary with secondary-market liquidity.

Across all specifications, X denotes the standard set of bond-level control variables, Coupon Rate, ln(Issue Size), and Time to Maturity, which account for differences in contractual cash flows, marketability, and duration risk (Elton et al.,

2001; Longstaff et al., 2005), together with Credit Rating to control for credit risk.

Variable Definitions

The dependent variable, $\text{Spread}_{(i,t)}$, is the corporate bond's yield spread over the comparable-maturity government benchmark yield for bond *i* at time *t*, expressed in basis points. In Table 4, Spread is replaced by Yield, the bond's yield to maturity, which serves as an alternative dependent variable.

Refinancing pressure is measured at two levels. At the bond level, RefWall is defined as the ratio of the issuer's outstanding corporate bond principal maturing within one year to its total outstanding corporate bond principal. The variable captures the concentration of the issuer's aggregate corporate bond maturity profile and therefore reflects firm-wide bond refinancing pressure. As a discrete alternative to this continuous measure, $\text{NearMat1Y}_{(i,t)}$ equals one when the bond has one year or less remaining to maturity and zero otherwise. At the issuer level, $\text{RefWall}_{(i,t)}$, the Refinancing Wall, is defined as the ratio of the issuer's outstanding corporate bond principal maturing within one year to its total outstanding corporate bond principal, this variable reflects the concentration of an issuer's aggregate maturity profile and thus firm-wide funding pressure (Choi et al., 2021).

Market liquidity is proxied by $\ln(\text{tv})_{(i,t)}$, the natural logarithm of trading value for bond *i* in period *t*, where higher values indicate greater secondary-market trading activity and market depth (Bao et al., 2011). To test whether the pricing effect of each refinancing-pressure measure is conditional on liquidity, three interaction terms are constructed: $\text{Rollover}_{(i,t)} \times \ln(\text{tv})_{(i,t)}$, $\text{NearMat1Y}_{(i,t)} \times \ln(\text{tv})_{(i,t)}$, and $\text{RefWall}_{(i,t)} \times \ln(\text{tv})_{(i,t)}$, each interaction indicates whether the association between the corresponding refinancing-pressure measure and bond pricing varies with trading liquidity.

The vector of control variables, $X_{i,t}$, includes $CouponRate_{i,t}$, which controls for differences in contractual cash-flow structures; $CreditRating_{i,t}$, coded from 1 to 8 with higher values indicating lower credit quality, which controls for baseline credit risk; $\ln(issue_size_{i,t})$, the natural logarithm of the bond's issue size, which captures differences in bond marketability; and $TTM_{i,t}$, measured in years, which controls for duration and term-premium effects distinct from near-term rollover pressure.

Because contractual maturity dates are determined at issuance, contemporaneous bond prices cannot alter the scheduled maturity of an outstanding bond. This feature

reduces concerns about reverse causality with respect to maturity timing. However, secondary-market liquidity and bond pricing may still be jointly determined. The estimates are therefore interpreted as conditional associations rather than causal effects. All specifications include issuer fixed effects, μ_i, which absorb time-invariant unobserved heterogeneity across issuers such as industry, ownership structure, or baseline credit culture, and year–month fixed effects, λ_t, which absorb common macro-financial shocks affecting all bonds in a given period, such as monetary policy shifts or market-wide risk sentiment. The idiosyncratic error term, $\varepsilon_{(i,t)}$, is clustered at the issuer level throughout to account for within-issuer serial correlation across bond-time observations.

Robustness: Yield as an Alternative Dependent Variable

To assess whether the results depend on the construction of the spread measure, Specifications (1)–(8) are re-estimated using corporate bond yield as the dependent variable. Unlike Spread, Yield includes both the benchmark interest-rate component and compensation for credit, liquidity, and other risks. Similar results across the spread and yield specifications would indicate that the documented relationships are not specific to the government-benchmark adjustment embedded in Spread.

Empirical Results

Descriptive Statistics

Table 1 reports descriptive statistics for the full sample of 13,532 bond-month observations. Credit Rating is available for 13,093 observations because of missing rating information. Corporate bond pricing displays considerable heterogeneity: the average spread is 134.85 basis points, above the median of 120 basis points, while yields range from 1.28% to 13%. This dispersion suggests that a subset of bonds carries substantially higher required returns, potentially reflecting weaker credit quality, limited liquidity, or greater refinancing pressure.

The maturity measures indicate that immediate refinancing pressure is concentrated in a relatively small portion of the sample. NearMat1Y has a mean of 0.047, implying that 4.7% of observations involve bonds maturing within one year. Rollover is positively skewed, showing that pressure rises sharply for bonds very close to maturity. RefWall has a median and 75th percentile of zero but reaches one, suggesting that issuer-level refinancing concentration is generally limited yet becomes substantial in a limited subset of issuer-month observations. This supports the view that

refinancing walls are episodic rather than persistent.

Table 1: Descriptive Statistics

Variable	N	Mean	SD	Min	25th	Median	75th	Max
Spread	13,532	134.852	80.389	24.044	80.000	120.000	167.000	495.679
Yield	13,532	3.254	0.956	1.280	2.667	3.200	3.756	13.000
NearMat1Y	13,532	0.047	0.211	0.000	0.000	0.000	0.000	1.000
Rollover	13,532	0.349	0.357	0.039	0.144	0.245	0.408	5.525
RefWall	13,532	0.045	0.122	0.000	0.000	0.000	0.000	1.000
ln(tv)	13,532	16.984	2.164	6.909	15.499	17.220	18.591	22.791
CouponRate	13,532	3.555	1.134	0.000	3.150	3.645	4.120	8.000
CreditRating	13,093	3.474	0.998	1.000	3.000	3.000	4.000	8.000
ln(issue_size)	13,532	7.984	0.885	2.996	7.410	8.006	8.540	10.309
TTM	13,532	4.911	3.205	0.181	2.452	4.083	6.924	25.955

Notes: This table reports descriptive statistics for the bond-month variables used in the analysis. The full sample contains 13,532 observations; Spread is measured in basis points, while Yield and Coupon Rate are expressed in percent, and TTM is measured in years. NearMat1Y equals one for bonds maturing within one year. Rollover equals (1/TTM), RefWall is the proportion of an issuer's outstanding corporate bond principal maturing within one year, and ln(tv) and ln(issue_size) are the natural logarithms of trading value and issue size. Credit Rating ranges from 1 to 8, with higher values indicating lower credit quality. Continuous variables are winsorized at the 1st and 99th percentiles where applicable.

Liquidity also varies substantially across bonds, as reflected in the wide distribution of ln(tv). This variation is central to the analysis because limited trading activity may increase the compensation investors require when issuers face concentrated maturities. The sample also covers meaningful differences in coupon rates, credit quality, issue size, and remaining maturity, allowing the empirical models to separate refinancing and liquidity effects from other bond characteristics.

Correlation Matrix

Table 2 reports on the pairwise Pearson correlations among the variables used in the empirical analysis. Corporate bond Spread is strongly correlated with Yield (r=0.827), which is expected because both variables capture closely related dimensions of investors' required returns. However, these variables are used as alternative dependent variables rather than included together as regressors, so this high correlation does not create a multicollinearity concern in the estimated models.

Table 2: Correlation Matrix

	Spread	Yield	Rollover	RefWall	ln(tv)	CouponRate	CreditRating	ln(issue_size)
Spread								
Yield	0.827							
Rollover	-0.140	-0.282						
RefWall	-0.015	-0.229	0.484					
ln(tv)	-0.314	-0.304	0.004	0.001				
CouponRate	0.635	0.645	-0.279	-0.155	-0.299			
CreditRating	0.661	0.594	-0.178	-0.099	-0.167	0.498		
ln(issue_size)	-0.265	-0.210	-0.127	-0.107	0.162	-0.064	-0.157	
TTM	0.149	0.276	-0.624	-0.272	0.160	0.300	0.159	0.057

Notes: This table reports pairwise Pearson correlation coefficients among the variables used in the empirical analysis. Spread is measured in basis points, while Yield and Coupon Rate are expressed in percent. Rollover equals (1/TTM), RefWall measures the proportion of issuer debt maturing within one year, and ln(tv) and ln(issue_size) are the natural logarithms of trading value and issue size. Credit Rating ranges from 1 to 8, with higher values indicating lower credit quality. Correlations are calculated using pairwise complete observations.

Spread is positively associated with Coupon Rate (r=0.635) and Credit Rating (r=0.661). Because higher numerical rating values indicate lower credit quality, these correlations suggest that bonds with weaker credit ratings and higher coupon rates tend to exhibit wider credit spreads. Trading liquidity is negatively correlated with both Spread (r=-0.314) and Yield (r=-0.304), consistent with the view that more actively traded bonds require lower liquidity compensation.

Among the explanatory variables, most pairwise correlations are moderate or low. The largest correlations include those between Rollover and TTM (r=-0.624), Coupon Rate and Credit Rating ((r=0.498)), and Rollover and RefWall (r=0.484). These values remain below the conventional thresholds of 0.70 or 0.80 commonly used to indicate potentially severe multicollinearity. Therefore, the correlation matrix does not suggest a general multicollinearity problem.

Regression Results

Of the 13,532 observations reported in Table 1, 439 are excluded because of missing regression covariates, primarily Credit Rating, and a further 17 are removed as fixed-effect singletons, yielding a final estimation sample of 13,076 observations. Table 3 reports the results of eight issuer fixed-effects specifications, organized into three

groups: bond-level measures (columns 1–4), the issuer-level measure (columns 5–6), and joint models combining both levels (columns 7–8). All eight specifications yield R-squared values within a narrow range of 0.817 to 0.821, indicating that the inclusion of additional variables and interaction terms does not materially change the overall explanatory power of the model. The meaningful differences across specifications therefore lie in the behavior of the key refinancing-risk variables themselves rather than in overall model fit.

In column (1), NearMat1Y carries a coefficient of -14.329 and is statistically significant at the 1% level, indicating that bonds within one year of maturity trade at spreads roughly 14.3 basis points lower than other bonds, holding other factors constant. This is the opposite direction from what a pure rollover risk story would predict, under which spreads should rise as maturity approaches. The result is more consistent with a pull-to-par or duration-reduction effect, as a bond nears maturity, its price risk and duration exposure fall, which may dominate any refinancing-risk premium in this specification.

Once the NearMat1Y × ln(tv) interaction is introduced in column (2), the main effect of NearMat1Y loses statistical significance (-11.819, not significant at conventional levels), and the interaction term itself is also insignificant (-0.147). This suggests that, in isolation, without controlling for issuer-level refinancing concentration, there is insufficient evidence that the pricing effect of near-maturity status is conditional on market liquidity.

The continuous Rollover measure in column (3) shows a coefficient of -17.892, significant at the 1% level, consistent in direction with the NearMat1Y result: shorter remaining maturity (higher Rollover) is associated with lower spreads. When the liquidity interaction is added in column (4), the main effect of Rollover grows in magnitude to -35.261 and remains significant at the 5% level, while the Rollover × ln(tv) interaction is positive (0.992) but statistically insignificant. Taken together, neither bond-level specification in isolation provides clear evidence that liquidity conditions the pricing of bond-level refinancing risk.

Table 3: Corporate Bond Spread and Refinancing/Rollover Risk

Variables	Bond-Level Measures				Issuer-Level Measure		Joint Models	
	NearMat1Y		Rollover		RefWall		NearMat1Y and RefWall	Rollover and RefWall
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NearMat1Y	-14.329***	-11.819					-75.161***	
	(3.437)	(16.801)					(18.176)	
Rollover			-17.892***	-35.261**				-69.521***
			(3.571)	(17.692)				(16.157)
RefWall					6.635	136.332***	194.341***	191.826***
					(8.807)	(41.399)	(50.280)	(43.100)
ln(tv)	-2.283***	-2.277***	-2.207***	-2.540***	-2.354***	-1.951***	-1.873***	-2.629***
	(0.328)	(0.319)	(0.333)	(0.369)	(0.323)	(0.308)	(0.308)	(0.375)
CouponRate	9.116***	9.114***	9.288***	9.356***	8.904***	8.712***	8.902***	9.203***
	(1.678)	(1.678)	(1.703)	(1.712)	(1.643)	(1.639)	(1.662)	(1.695)
CreditRating	13.010***	13.012***	12.360***	12.320***	13.802***	13.857***	13.013***	12.387***
	(3.176)	(3.175)	(3.231)	(3.220)	(3.044)	(3.051)	(3.214)	(3.240)
ln(issue_size)	-0.128	-0.131	0.022	0.058	-0.149	-0.180	-0.078	0.115
	(1.395)	(1.396)	(1.384)	(1.377)	(1.402)	(1.411)	(1.398)	(1.373)
TTM	5.404***	5.403***	4.509***	4.492***	5.627***	5.625***	5.395***	4.414***
	(0.497)	(0.496)	(0.474)	(0.477)	(0.512)	(0.512)	(0.500)	(0.480)
NearMat1Y x ln(tv)		-0.147					3.324***	
		(0.920)					(0.978)	
Rollover x ln(tv)				0.992				2.881***
				(0.906)				(0.825)
Refwall x ln(tv)						-7.814***	-10.324***	-10.318***
						(2.549)	(2.980)	(2.627)
Issuer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Num.obs	13,076	13,076	13,076	13,076	13,076	13,076	13,076	13,076
R-squared	0.818	0.818	0.820	0.820	0.817	0.818	0.819	0.821

Notes: This table reports issuer fixed-effects regressions of corporate bond spreads on bond-level and issuer-level refinancing-risk measures. NearMat1Y equals one for bonds maturing within one year, Rollover is measured as (1/TTM), and RefWall is the proportion of an issuer's outstanding debt maturing within one year. ln(tv) denotes the natural logarithm of monthly trading value. Credit Rating ranges from 1 to 8, with higher values indicating lower credit quality. Standard errors clustered at the issuer level are reported in parentheses. All specifications include issuer and year-month fixed effects. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

In column (5), RefWall carries a coefficient of 6.635 but is not statistically significant, indicating that, absent an interaction term, issuer-level refinancing concentration alone does not significantly explain spreads.

In column (6), the positive coefficient on RefWall and the negative coefficient on RefWall × Ln(Trading Value) imply that the marginal association between issuer-level refinancing concentration and bond spreads declines as trading liquidity increases. Because the model includes an interaction, the RefWall coefficient alone should not be interpreted as an unconditional refinancing premium. The economically relevant quantity is the marginal effect evaluated at observed liquidity levels.

The joint models are the most informative specifications in the table, as they test whether both levels of refinancing pressure remain significant once each is controlled for the other.

In column (7), which combines NearMat1Y and RefWall, NearMat1Y carries a coefficient of -75.161, significant at the 1% level, and its interaction with liquidity, NearMat1Y × ln(tv), is positive at 3.324, also significant at the 1% level. RefWall simultaneously carries a coefficient of 194.341, significant at the 1% level, with its interaction, RefWall × ln(tv), at -10.324, also significant at the 1% level. Both variables and both interaction terms remain statistically significant after controlling for one another, indicating that the bond-level and issuer-level refinancing channels are distinct and non-redundant, neither fully subsumes the other.

Notably, once RefWall is controlled for, the NearMat1Y × ln(tv) interaction becomes positive and significant, in contrast to its insignificance in column (2). This suggests that once issuer-level refinancing pressure is netted out, the pricing effect of near-maturity status is itself revealed to be liquidity-dependent: among near-maturity bonds. The positive NearMat1Y × ln(tv) coefficient indicates that the negative association between near-maturity status and spreads becomes less negative as liquidity increases. This pattern differs from the RefWall interaction and appears to capture a distinct maturity-related pricing effect rather than the same positive refinancing premium represented by issuer-level concentration.

Column (8), which combines Rollover and RefWall, shows a closely parallel pattern. Rollover carries a coefficient of -69.521, significant at the 1% level, with its interaction, Rollover × ln(tv), positive at 2.881, also significant at the 1% level. RefWall carries a coefficient of 191.826, significant at the 1% level, with its interaction, RefWall

× ln(tv), at -10.318, also significant at the 1% level. These results corroborate the findings in column (7), confirming that the pattern holds when the bond-level refinancing measure is switched from a discrete indicator to a continuous variable.

The control variables display consistent signs and significance across all eight specifications. ln(tv) is negative and significant at the 1% level throughout, ranging from -1.873 to -2.629, confirming that higher trading liquidity is consistently associated with lower spreads, in line with standard liquidity-premium theory. CouponRate and CreditRating are both positive and significant at the 1% level in every column. Because CreditRating is coded such that higher values denote lower credit quality, its positive sign is intuitive: deteriorating credit quality (a higher rating value) is associated with wider spreads. Time to Maturity (TTM) is likewise positive and significant across all columns, ranging from 4.414 to 5.627, reflecting the expected term premium. ln(issue_size), by contrast, is statistically insignificant in every specification, indicating that issue size has no significant independent effect on spreads once other factors are controlled for.

The central finding of Table 3 is that issuer-level refinancing concentration is priced conditionally on liquidity. This relationship is already evident in column (6), where the RefWall interaction is significant. The joint specifications in columns (7) and (8) additionally show that bond-level maturity measures retain distinct explanatory power after issuer-level refinancing concentration is controlled for.

Table 4 replicates the eight specifications from Table 3, replacing Spread with Yield as the dependent variable. This serves as a robustness check on whether the refinancing-risk results are specific to the spread construction or hold under bond yield directly. R-squared ranges narrowly from 0.841 to 0.842 across all columns, again indicating stable overall fit regardless of specification.

NearMat1Y is statistically insignificant on its own, both without the liquidity interaction (0.001, column 1) and with it (0.081, column 2; interaction term -0.005, also insignificant). Rollover shows the same pattern: -0.027 in column (3) and -0.031 in column (4), neither significant, with an insignificant interaction term (0.000). In isolation, then, bond-level refinancing measures show no discernible relationship with bond yields, consistent with the spread results in Table 3, where these same standalone specifications were similarly weak or inconsistent in sign.

Table 4: Corporate Bond Yield and Refinancing/Rollover Risk

Variables	Bond-Level Measures				Issuer-Level Measure		Joint Models	
	NearMat1Y		Rollover		RefWall		NearMat1Y and RefWall	Rollover and RefWall
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NearMat1Y	0.001	0.081					-0.584***	
	(0.038)	(0.178)					(0.186)	
Rollover			-0.027	-0.031				-0.380**
			(0.032)	(0.180)				(0.171)
RefWall					0.166*	1.575***	2.061***	1.953***
					(0.095)	(0.456)	(0.535)	(0.483)
ln(tv)	-0.023***	-0.023***	-0.023***	-0.023***	-0.023***	-0.019***	-0.019***	-0.024***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)
CouponRate	0.087***	0.087***	0.088***	0.088***	0.087***	0.085***	0.085***	0.087***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)
CreditRating	0.150***	0.150***	0.148***	0.148***	0.151***	0.152***	0.150***	0.148***
	(0.046)	(0.046)	(0.046)	(0.046)	(0.045)	(0.045)	(0.046)	(0.046)
ln(issue_size)	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
TTM	0.110***	0.110***	0.108***	0.108***	0.110***	0.110***	0.110***	0.107***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
NearMat1Y x Ln(tv)		-0.005					0.032***	
		(0.010)					(0.010)	
Rollover x Ln(tv)				0.000				0.019**
				(0.009)				(0.009)
Refwall x (ln(tv)						-0.085***	-0.112***	-0.106***
						(0.027)	(0.031)	(0.029)
Issuer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Num.obs	13,076	13,076	13,076	13,076	13,076	13,076	13,076	13,076
R-squared	0.841	0.841	0.841	841	841	841	0.842	0.842

Notes: This table reports issuer fixed-effects regressions of corporate bond yields on bond-level and issuer-level refinancing-risk measures. NearMat1Y equals one for bonds maturing within one year, Rollover is measured as (1/TTM), and RefWall is the proportion of an issuer's outstanding debt maturing within one year. ln(tv) denotes the natural logarithm of monthly trading value. Credit Rating ranges from 1 to 8, with higher values indicating lower credit quality. Standard errors clustered at the issuer level are reported in parentheses. All specifications include issuer and year-month fixed effects. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

RefWall is positive and weakly significant on its own (0.166, significant at the 10% level, column 5). Once the liquidity interaction is added in column (6), RefWall strengthens considerably to 1.575, significant at the 1% level, while RefWall × ln(tv) is negative at -0.085, also significant at the 1% level. As in the spread results, this indicates that issuer-level refinancing concentration raises bond yields, but the effect is concentrated among bonds with lower trading liquidity, and this effect is progressively offset as liquidity improves.

The joint specifications again bring the bond-level effects to life. In column (7), combining NearMat1Y and RefWall, NearMat1Y becomes negative and significant at the 1% level (-0.584), with a positive and significant interaction term (NearMat1Y × ln(tv) = 0.032, 1% level). RefWall remains significant and larger in magnitude (2.061, 1% level), with its interaction (-0.112) also significant at the 1% level. In column (8), combining Rollover and RefWall, Rollover becomes significant at the 5% level (-0.380), with a positive, 5%-significant interaction (0.019), while RefWall (1.953) and its interaction (-0.106) remain significant at the 1% level.

This mirrors the pattern in the spread regressions almost exactly: once issuer-level refinancing concentration is controlled for, the bond-level refinancing measures, previously insignificant in isolation, emerge as significant, liquidity-dependent determinants of yield. The negative RefWall interaction indicates that the positive association between issuer-level refinancing concentration and yield weakens as liquidity improves. By contrast, the positive interactions involving NearMat1Y and Rollover indicate that their negative maturity-related associations become less negative at higher levels of liquidity. The bond-level and issuer-level interactions therefore represent economically distinct patterns.

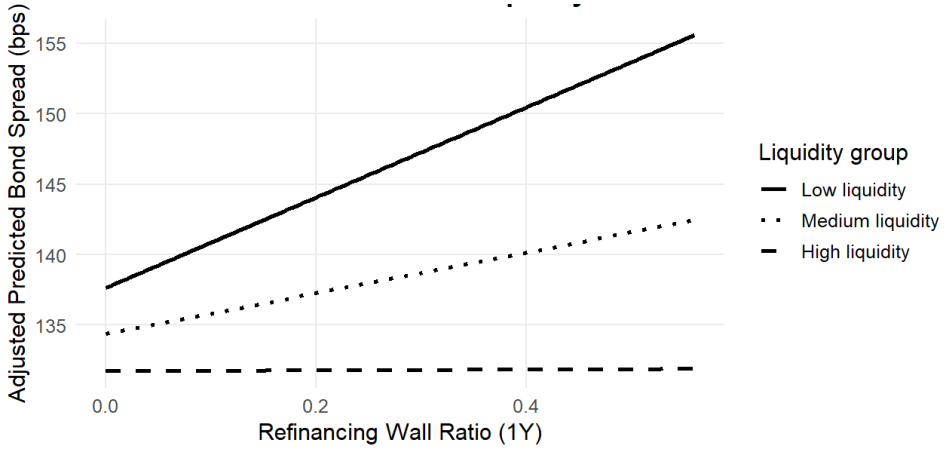
ln(tv) is negative and significant at the 1% level in every column (-0.019 to -0.024), confirming that greater trading liquidity is associated with lower yields. CouponRate (0.085–0.088) and CreditRating (0.148–0.152) are both positive and significant at the 1% level throughout, with the CreditRating result again indicating that lower credit quality (higher rating value) is priced into higher yields. TTM is positive and significant across all columns (0.107–0.110), consistent with a standard term premium. Ln(issue_size) remains statistically insignificant in every specification.

The yield regressions in Table 4 corroborate the spread results in Table 3: refinancing risk is priced in a liquidity-contingent manner. The yield regressions confirm that issuer-level refinancing concentration provides the clearest and most

consistently positive refinancing-risk measure, while the joint specifications reveal additional bond-level maturity effects. Standalone bond-level measures (NearMat1Y, Rollover) show no significant relationship with yields, while RefWall alone shows only a weak positive association. In the joint models, however, all interaction terms become statistically significant, reinforcing the conclusion that issuer-level refinancing concentration is the dominant channel through which liquidity conditions the pricing of refinancing risk, and that bond-level maturity effects are only revealed once this issuer-level channel is properly accounted for. The consistency of this pattern across both spread and yield as dependent variables strengthens confidence that the finding is not an artifact of how the pricing measure is constructed.

Liquidity-Dependent Effects of Refinancing Pressure: Evidence from Marginal Effects

Figures 1–3 illustrate how the pricing effect of issuer-level refinancing concentration varies with secondary-market liquidity. The figures are based on the joint specification in Table 3, Model (8), which controls for the continuous bond-level Rollover measure, RefWall, and their interactions with trading liquidity.



Notes: The figures are based on Table 3, Model (8). Low, medium, and high liquidity correspond to the 25th percentile, median, and 75th percentile of ln(tv), respectively. In Figure 1, Rollover and the continuous control variables are held at their sample medians. Error bars and shaded areas represent 95% confidence intervals calculated from issuer-clustered standard errors.

Figure 1 Refinancing Pressure and Bond Spreads: The Role of Market Liquidity

Figure 1 plots adjusted predicted bond spreads against the refinancing wall ratio at low, medium, and high levels of liquidity. The slopes differ substantially across the three liquidity regimes. Under low liquidity, the predicted spread rises from approximately 138 to 156 basis points as RefWall increases from zero to about 0.6. The corresponding increase is smaller under medium liquidity, from approximately 134 to 143 basis points. Under high liquidity, the predicted spread remains almost unchanged at approximately 132 basis points. These patterns indicate that issuer-level refinancing concentration is associated with wider spreads primarily when secondary-market liquidity is limited.

Figure 2 reports the marginal effect of RefWall at the 25th percentile, median, and 75th percentile of log trading value. The estimated effect is approximately 32 basis points under low liquidity, compared with approximately 14 basis points under medium liquidity and nearly zero under high liquidity. The 95% confidence interval excludes zero only under low liquidity. At medium and high liquidity, the confidence intervals include zero, indicating that the estimated refinancing-wall effect is not statistically distinguishable from zero at conventional levels in these regimes. The result therefore shows that the economic and statistical importance of refinancing concentration is concentrated in the low-liquidity segment of the market.

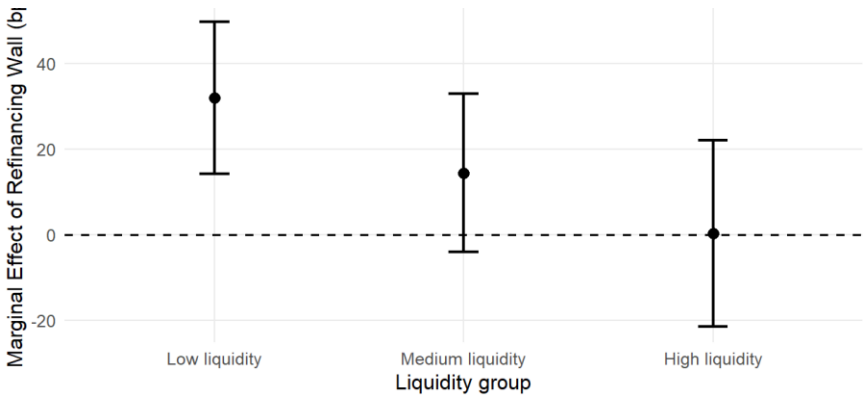


Figure 2 Marginal Effect of Refinancing Pressure across Liquidity Regimes

Figure 3 presents the marginal effect of RefWall continuously across the observed liquidity distribution. The estimated effect declines approximately linearly as log trading value increases. It is positive and statistically significant at low levels of liquidity, becomes smaller and less precisely estimated around the middle of the

distribution, and crosses the point estimate crosses zero at a log trading value of approximately 18.6. Beyond this point, the point estimate becomes negative; however, its confidence interval includes zero over much of the high-liquidity range. The negative point estimates should therefore not be interpreted as evidence that refinancing concentration necessarily reduces spreads in highly liquid markets. Rather, the figure indicates that the positive refinancing premium disappears as liquidity improves.

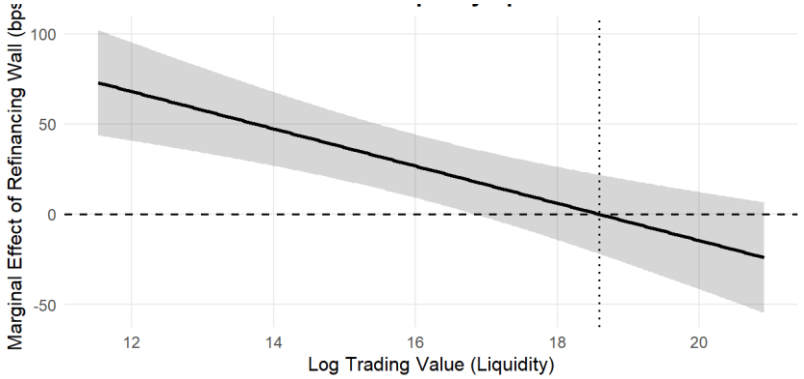


Figure 3 Marginal Effect of Refinancing Pressure across the Liquidity Spectrum

Taken together, the three figures provide consistent evidence that issuer-level refinancing concentration is not uniformly priced across market conditions. A higher refinancing wall is associated with economically meaningful increases in corporate bond spreads when liquidity is low, whereas the association becomes weaker and statistically indistinguishable from zero as trading liquidity improves. These findings support the interpretation that secondary-market liquidity conditions the pricing of issuer-level refinancing pressure. Bond-level maturity exposure remains controlled for in Model (8), so the figures isolate the marginal association of the issuer-level refinancing wall rather than attributing the pattern solely to individual bond maturity.

Discussions

Empirical evidence from this study provides a coherent view of how corporate bond spreads and yields reflect the interaction between liquidity conditions and refinancing pressure. Consistent with a large body of literature on bond market liquidity (Bao et al., 2011; Longstaff et al., 2005), liquidity emerges as a central and stable determinant of bond pricing. Across all eight specifications in both the spread and yield regressions, bonds with higher trading activity are associated with significantly lower spreads and yields, reflecting lower transaction costs and

improved market functioning.

A key insight of this study is that refinancing pressure is most clearly captured by issuer-level maturity concentration, while bond-level maturity timing provides a distinct and complementary pricing channel. When estimated separately, the bond-level measures either display unexpected signs or lack statistical significance. By contrast, the RefWall interaction provides a consistently positive refinancing-risk interpretation: the marginal effect of issuer-level maturity concentration is strongest when liquidity is low and weakens as liquidity improves. The joint specifications further show that bond-level maturity measures retain incremental explanatory power after issuer-level concentration is controlled for.

Moreover, the results demonstrate that the pricing of refinancing risk, once both levels are properly specified, is conditional on market liquidity. When secondary-market liquidity is high, the pricing premium associated with issuer-level refinancing concentration is substantially smaller, and the interaction terms show that this liquidity dampens the spread- and yield-widening effect of concentrated maturities. In contrast, when liquidity deteriorates, refinancing constraints become more binding, and investors demand higher compensation for issuer-level refinancing concentration, while bond-level maturity measures exhibit a separate maturity-related pricing pattern. This pattern is consistent across both dependent variables, spread and yield, which strengthens confidence that the mechanism is not an artifact of how bond pricing is measured.

This interpretation aligns with theoretical models in which rollover risk is amplified by funding frictions (Acharya et al., 2011; Diamond, 1991; He & Xiong, 2012). In such settings, firms facing concentrated debt maturities are more vulnerable to refinancing shocks, particularly when market liquidity is constrained. The empirical results align with these predictions, but with an important refinement: the vulnerability captured by bond-level maturity measures is only priced clearly once the issuer's aggregate refinancing concentration is also accounted for, indicating that investors price refinancing risk with reference to the issuer's overall debt structure rather than any single bond's characteristics.

Robustness is reinforced by the replication of results using bond yield in place of spread as the dependent variable. The yield specifications reproduce the principal issuer-level liquidity interaction and the joint-model pattern, although the standalone bond-level coefficients are weaker than in the spread regressions. The consistency

of the RefWall interaction across both dependent variables indicates that the result is not specific to the construction of Spread, supporting the conclusion that these findings are not specific to the spread construction.

Thus, the findings suggest that liquidity and refinancing pressure should not be analyzed in isolation, nor should bond-level and issuer-level refinancing measures be analyzed separately. Their joint interaction plays a central role in shaping bond pricing. By highlighting both the issuer-level nature of refinancing risk and its dependence on market liquidity, this study provides a more comprehensive framework for understanding corporate bond pricing, particularly in emerging market contexts.

Theoretical Contributions

This study makes three main contributions to the literature on corporate bond pricing and rollover risk.

First, the study distinguishes bond-level maturity timing from issuer-level refinancing concentration and shows that the latter is priced conditionally on secondary-market liquidity. The joint specifications additionally reveal that bond-level maturity measures contain incremental information once issuer-level concentration is controlled for. Rather than representing a single, uniform pricing channel, the two levels capture distinct dimensions of refinancing pressure. Issuer-level concentration provides the clearest positive refinancing-risk interpretation, particularly under low-liquidity conditions, while bond-level maturity measures exhibit a separate maturity-related pricing pattern. This distinction extends the conventional empirical approach, which often relies primarily on standalone bond-level maturity proxies, and highlights the importance of incorporating issuer-level maturity concentration into corporate bond pricing models.

Second, the study develops a unified, state-dependent framework that integrates liquidity risk with refinancing pressure across two levels of aggregation. By explicitly modeling the interaction between liquidity and each refinancing measure, and by estimating bond-level and issuer-level measures both separately and jointly, the analysis bridges two strands of literature, liquidity-based asset pricing and debt maturity risk, that have largely evolved separately. The joint-model results demonstrate that these forces should be considered together, as their interaction plays a central role in shaping bond spreads and yields.

Third, the study highlights issuer-level refinancing concentration as the most directly interpretable measure of refinancing pressure in the empirical results. Its pricing effect is positive under low-liquidity conditions and weakens as liquidity improves, while bond-level maturity measures capture a distinct maturity-related component. More broadly, the findings suggest that concentrated issuer-level maturity structures may amplify financial vulnerability when secondary-market liquidity is constrained.

Policy Implications

The findings carry important implications for policymakers and market regulators, particularly in the context of Thailand's corporate bond market.

First, the results suggest that monitoring liquidity alone is insufficient for assessing market stability, and that bond-level maturity indicators alone are similarly insufficient. Periods of concentrated debt maturities at the issuer level can create latent refinancing pressures that may not be immediately visible under normal market conditions but can materialize rapidly during liquidity shocks. This implies that refinancing concentration, measured at the issuer level rather than the individual bond level, may serve as a useful indicator of issuer-level and broader market refinancing vulnerability.

Second, the evidence highlights the need for enhanced market surveillance frameworks that track refinancing risk at the appropriate level of aggregation. For institutions such as the Thai Bond Market Association (ThaiBMA), incorporating indicators such as issuer-level refinancing wall ratios, rather than, or in addition to, bond-level maturity indicators, into monitoring systems could strengthen early warning capabilities. Such tools would allow regulators to identify periods in which refinancing needs are concentrated across multiple issuers, even before market stress becomes apparent.

Third, the results underscore the role of market liquidity as a stabilizing condition that moderates the pricing of issuer-level refinancing exposure. Policies aimed at improving secondary-market liquidity, such as encouraging market-making activities, broadening the investor base, and enhancing trading transparency, may reduce the pricing premium associated with refinancing concentration. In more liquid markets, stronger investor absorption capacity and greater market depth may lessen the extent to which concentrated maturities are reflected in higher bond spreads and yields.

Conclusion

Brief Summary

This study revisits corporate bond pricing by focusing on the interaction between market liquidity and refinancing pressure, measured at both the bond level and the issuer level. Using bond-level data from the Thai corporate bond market, the analysis shows that liquidity is a primary and robust determinant of both bond spreads and yields, while issuer-level refinancing concentration is priced conditionally on liquidity, while joint specifications reveal additional bond-level maturity effects.

The main contribution of the study lies in demonstrating that the effect of refinancing pressure is conditional on market liquidity, and that this conditionality operates primarily through issuer-level refinancing concentration. Bond-level measures of maturity exposure, near-maturity status and rollover risk, show little explanatory power on their own but become significant, liquidity-dependent determinants of pricing once issuer-level refinancing concentration is controlled for. This finding suggests that secondary-market liquidity serves as a conditioning factor in the pricing of issuer-level refinancing concentration.

These results have several implications. From a theoretical perspective, they support models that emphasize the interaction between funding constraints and market liquidity in determining credit spreads, while also highlighting the importance of the level at which refinancing risk is measured. From an empirical standpoint, they suggest that examining liquidity and rollover risk separately or examining bond-level and issuer-level refinancing measures in isolation from one another may provide an incomplete account of bond pricing. From a policy perspective, the findings highlight the importance of monitoring refinancing concentration at the issuer level, particularly in environments where secondary market liquidity is limited.

At the same time, the results should be interpreted with appropriate caution. While the empirical strategy exploits variation in maturity structure and liquidity conditions, the findings are primarily associative rather than strictly causal. In addition, the analysis focuses on a single emerging market, and the extent to which these results generalize to other markets remains an open question.

Future research may extend this analysis by incorporating macro-financial conditions and cross-country comparisons to further explore the interaction between liquidity and refinancing risk. Such extensions would help deepen our understanding of

how market structure shapes the pricing of corporate debt.

Limitations and Directions of Future Research

Despite its contributions, this study has four limitations that provide directions for future research.

First, the analysis adopts a reduced-form empirical approach and therefore does not explicitly identify the structural mechanisms linking secondary-market liquidity, refinancing pressure, and bond pricing. Moreover, liquidity and bond pricing may be jointly determined, which limits the causal interpretation of the estimated coefficients. Future research could employ structural models, instrumental-variable approaches, or quasi-experimental designs to better identify the underlying mechanisms and causal effects.

Second, the study measures liquidity using trading value and does not directly incorporate market-microstructure factors such as dealer behavior, market-making capacity, bid–ask spreads, or price impact. Although trading value captures variation in market activity and depth, it may not fully reflect transaction costs or dealer balance-sheet constraints. Access to transaction-level or dealer-level data would allow future studies to examine more precisely how liquidity shocks are reflected in bond prices and refinancing premium.

Third, the robustness analysis is limited to replacing the spread with bond yield as the dependent variable. Although the yield results support the main issuer-level liquidity interaction, additional tests would strengthen confidence in the findings. Future research could employ alternative near-maturity thresholds, alternative liquidity proxies, and lagged liquidity measures.

Fourth, the analysis focuses on a single emerging corporate bond market. Thailand provides an informative setting because of its heterogeneous secondary-market liquidity and growing corporate bond sector, but institutional features may limit the generalizability of the results. Cross-country studies could assess whether the documented relationships hold in markets with different investor structures, regulatory frameworks, dealer systems, and levels of market development.

References

Acharya, V. V., Gale, D., & Yorulmazer, T. (2011). Rollover risk and market freezes. *The Journal of Finance*, *66*(4), 1177-1209.

Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics*, *77*(2), 375-410.

Adrian, T., Fleming, M., Shachar, O., & Vogt, E. (2017). Market liquidity after the financial crisis. *Annual Review of Financial Economics*, *9*, 43-83.

Almeida, H., Campello, M., Laranjeira, B., & Weisbenner, S. (2012). Corporate debt maturity and the real effects of the 2007 credit crisis. *Critical Finance Review*, *1*(1), 3-58.

Bao, J., Pan, J., & Wang, J. (2011). The illiquidity of corporate bonds. *The Journal of Finance*, *66*(3), 911-946.

Becker, B., & Ivashina, V. (2014). Cyclicality of credit supply: Firm level evidence. *Journal of Monetary Economics*, *62*, 76-93.

Bessembinder, H., Maxwell, W., & Venkataraman, K. (2006). Market transparency, liquidity externalities, and institutional trading costs in corporate bonds. *Journal of Financial Economics*, *82*(2), 251-288.

Broner, F. A., Lorenzoni, G., & Schmukler, S. L. (2013). Why do emerging economies borrow short term? *Journal of The European Economic Association*, *11*(suppl_1), 67-100.

Brooks, C. (2019). *Introductory Econometrics for Finance (4th ed.)*. Cambridge University Press.

Brunnermeier, M. K., & Pedersen, L. H. (2009). Market liquidity and funding liquidity. *The Review of Financial Studies*, *22*(6), 2201-2238.

Burger, J. D., Warnock, F. E., & Warnock, V. C. (2012). Emerging local currency bond markets. *Financial Analysts Journal*, *68*(4), 73-93.

Chen, H., Xu, Y., & Yang, J. (2021). Systematic risk, debt maturity, and the term structure of credit spreads. *Journal of Financial Economics*, *139*(3), 770-799.

Chen, L., Lesmond, D. A., & Wei, J. (2007). Corporate yield spreads and bond liquidity. *The Journal of Finance*, *62*(1), 119-149.

Choi, J., Hackbarth, D., & Zechner, J. (2018). Corporate debt maturity profiles. *Journal of Financial Economics*, *130*(3), 484-502.

Choi, J., Hackbarth, D., & Zechner, J. (2021). Granularity of corporate debt. *Journal of Financial and Quantitative Analysis*, *56*(4), 1127-1162.

Collin-Dufresn, P., Goldstein, R. S., & Martin, J. S. (2001). The determinants of credit spread changes. *The Journal of Finance*, *56*(6), 2177-2207.

Diamond, D. W. (1991). Debt maturity structure and liquidity risk. *The Quarterly Journal of Economics*, *106*(3), 709-737.

Dick-Nielsen, J., Feldhütter, P., & Lando, D. (2012). Corporate bond liquidity before and after the onset of the subprime crisis. *Journal of Financial Economics*,

103(3), 471-492.
Du, W., & Schreger, J. (2016). Local currency sovereign risk. *The Journal of Finance*, *71*(3), 1027-1070.
Duchin, R., Ozbas, O., & Sensoy, B. A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics*, *97*(3), 418-435.
Edwards, A. K., Harris, L. E., & Piwowar, M. S. (2007). Corporate bond market transaction costs and transparency. *The Journal of Finance*, *62*(3), 1421-1451.
Eichengreen, B., & Luengnaruemitchai, P. (2004). Why doesn't Asia have bigger bond markets? In: National Bureau of Economic Research Cambridge, Mass., USA.
Elton, E. J., Gruber, M. J., Agrawal, D., & Mann, C. (2001). Explaining the rate spread on corporate bonds. *The Journal of Finance*, *56*(1), 247-277.
Feldhütter, P., & Schaefer, S. M. (2018). The myth of the credit spread puzzle. *The Review of Financial Studies*, *31*(8), 2897-2942.
Friewald, N., Jankowitsch, R., & Subrahmanyam, M. G. (2012). Illiquidity or credit deterioration: A study of liquidity in the US corporate bond market during financial crises. *Journal of Financial Economics*, *105*(1), 18-36.
Gilchrist, S., & Zakrajšek, E. (2012). Credit spreads and business cycle fluctuations. *American Economic Review*, *102*(4), 1692-1720.
Gopalan, R., Song, F., & Yerramilli, V. (2014). Debt maturity structure and credit quality. *Journal of Financial and Quantitative Analysis*, *49*(4), 817-842.
Harford, J., Klasa, S., & Maxwell, W. F. (2014). Refinancing risk and cash holdings. *The Journal of Finance*, *69*(3), 975-1012.
He, Z., & Milbradt, K. (2014). Endogenous liquidity and defaultable bonds. *Econometrica*, *82*(4), 1443-1508.
He, Z., & Xiong, W. (2012). Rollover risk and credit risk. *The Journal of Finance*, *67*(2), 391-430.
Hendershott, T., Li, D., Livdan, D., & Schürhoff, N. (2020). Relationship trading in over-the-counter markets. *The Journal of Finance*, *75*(2), 683-734.
Houweling, P., Mentink, A., & Vorst, T. (2005). Comparing possible proxies of corporate bond liquidity. *Journal of Banking and Finance*, *29*(6), 1331-1358.
Huang, J.-Z., & Huang, M. (2012). How much of the corporate-treasury yield spread is due to credit risk? *The Review of Asset Pricing Studies*, *2*(2), 153-202.
Huber, P. J., & Ronchetti, E. M. (2009). *Robust Statistics (2nd ed.)*. John Wiley & Sons.
Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, *97*(3), 319-338.
Longstaff, F. A., Mithal, S., & Neis, E. (2005). Corporate yield spreads: Default risk or liquidity? New evidence from the credit default swap market. *The Journal of Finance*, *60*(5), 2213-2253.
Merton, R. C. (1974). On the pricing of corporate debt: The risk structure of interest rates. *The Journal of Finance*, *29*(2), 449-470.

Mian, A., & Santos, J. A. (2018). Liquidity risk and maturity management over the credit cycle. *Journal of Financial Economics*, *127*(2), 264-284.

O'Hara, M., & Zhou, X. A. (2021). Anatomy of a liquidity crisis: Corporate bonds in the COVID-19 crisis. *Journal of Financial Economics*, *142*(1), 46-68.