

Securities Lending Dynamics and Primary Market Allocation in Corporate Bond Offerings

Huu Nhan Duong[§]

George Baihan Wang[†]

September 2026

Abstract

We show that the need for trade intermediation in the issuance aftermarket creates a novel bookbuilding incentive in corporate bond offerings. Dealers frequently accommodate aftermarket purchase orders for new bond offerings by establishing negative inventory positions and borrowing from the securities lending market. We show that underwriters, who often act as secondary market dealers, facilitate this process by preferentially directing primary market allocations to insurers and mutual funds that participate in securities lending, especially in offerings with strong bookbuilding demand. Offerings with larger allocations to lending investors exhibit more favorable issuance pricing. Securities lending activity in the aftermarket is associated with better bond liquidity and healthier price formation. Our findings highlight securities lending as an important determinant of primary market allocations and an essential facilitator of a well-functioning aftermarket for corporate bond offerings.

JEL Classification: G12, G14, G32

Keywords: Corporate bonds, primary market, securities lending, dealer inventory.

[§]Department of Banking and Finance, Monash University. Email: huu.duong@monash.edu.

[†]School of Economics and Finance, Queensland University of Technology. Email: baihan.wang@qut.edu.au.
First draft: September 2025. This paper has benefited from discussions with and comments from Zhi Da, Arseny Gorbenko, Vidhan Goyal, Xiaolu Hu, Thanh Huynh, Yoshio Nozawa, Yancheng Qiu, Yushui Shi, Kumar Venkataraman, and participants at the 2026 Monash-Q Group Finance Colloquium and seminars at Deakin, Monash, and RMIT. We also thank an anonymous industry practitioner in the fixed-income underwriting sector for sharing institutional details of the primary market allocation process. All errors are our own responsibility.

1 Introduction

In a bookbuilt securities offering, underwriters set not only the price but also who receives the securities. Two classic incentives govern this discretion. In the canonical bookbuilding theory of [Benveniste and Spindt \(1989\)](#), this discretion solves an information problem: underwriters need investors’ private valuations to price the issue, and underpriced allocations are compensation for information production ([Hanley, 1993](#); [Cornelli and Goldreich, 2001](#)). In the profit-sharing view of [Loughran and Ritter \(2002\)](#), underwriters use underpriced IPO allocations to reward favored clients who generate revenue for them through commissions and other lines of business ([Reuter, 2006](#); [Nimalendran, Ritter, and Zhang, 2007](#); [Jenkinson, Jones, and Suntheim, 2018](#)). The same incentives also operate in corporate bond offerings, where investors’ information production and trading relationships with underwriters affect bond allocation decisions ([Cai, Helwege, and Warga, 2007](#); [Nikolova, Wang, and Wu, 2020](#); [Wang, 2021](#)).

However, in over-the-counter markets, underwriters’ work does not end at pricing and allocation: they typically act as dealers intermediating secondary market trades for the same offering. In the issuance aftermarket, dealers receive customer purchase orders for which they may have limited inventory to fill. The anticipated need for aftermarket liquidity provision may therefore enter the underwriters’ objective function when allocating the new offering in the primary market. We argue that securities lending connects this aftermarket liquidity provision incentive to primary market allocations. To meet customer purchase demand in the secondary market, dealers can establish “negative inventory” positions and borrow from securities lenders to settle transactions. Newly issued securities are available to borrow only if allocations reach investors willing to lend. Therefore, allocating to lending investors secures a readily available pool of lendable supply for the underwriters’ anticipated aftermarket intermediation.

The U.S. corporate bond market is a natural laboratory for testing this hypothesis: offerings are frequent and typically oversubscribed, secondary market trading peaks in the period following issuance, and the securities lending market is active. This paper documents three main findings on aftermarket trading and primary market allocations in corporate bond offerings. First, securities lending is a central mechanism enabling the smooth functioning of the issuance aftermarket. Borrowing demand for newly issued bonds rises sharply from the onset of issuance settlement, driven

by dealers who fill customer purchase orders with limited inventory on hand, accumulate negative inventory positions, and borrow bonds to cover them. Second, we trace this channel upstream to the primary market and show that underwriters preferentially allocate bonds to investors engaged in securities lending, particularly for offerings with strong primary market bookbuilding demand. Third, these dynamics carry tangible consequences for issuance outcomes: when underwriters allocate a larger share of the offering to lending investors, issuers obtain better pricing, and the resulting securities lending activity is associated with improved aftermarket trading conditions and more orderly post-issuance price discovery.

We begin by examining corporate bond trading dynamics in the issuance aftermarket. For a sample of 11,640 corporate bond offerings from 2012 to 2022, we show that secondary market activity is heavily concentrated in the period immediately following a bond's debut; trading volume typically peaks during the issuance month and declines substantially within the first few months before reaching a lower steady state (Figure 1). Using securities lending data from S&P Global, we find that borrowing demand for newly issued bonds rises sharply once bonds are physically delivered to investors on the issuance settlement date (the first day on which the bonds become available for lending) and remains elevated throughout the first 20 trading days post-settlement (Figure 2). This borrowing demand is specific to the new issue. Relative to the issuing firm's other outstanding bonds, the new offering exhibits disproportionately high borrowing demand, while its lendable supply and loan fees remain comparable to firm-level benchmarks. The pattern thus reflects an outward shift in the demand to borrow newly issued bonds.

Dealer liquidity provision in the issuance aftermarket is the primary economic force behind this borrowing demand. Using masked dealer identifiers in academic TRACE data, we construct daily dealer-level inventory positions for each bond. Dealers' negative inventory positions are the dominant driver of bond borrowing demand in the issuance aftermarket. At the extensive margin, each additional dealer entering a negative inventory position corresponds to approximately one additional open bond loan contract, demonstrating a tight mapping between individual dealer liquidity provision and securities lending. At the intensive margin, changes in aggregate dealer negative inventory are strongly associated with changes in on-loan quantity. The economic cost of this "borrow-to-sell" liquidity provision strategy is low: the loan fee dealers pay to borrow bonds over the aftermarket window is an order of magnitude smaller than the average spread they earn on a

single customer purchase transaction. Our findings on securities lending dynamics in the issuance aftermarket are consistent with [Goyal, Nozawa, and Qiu \(2026\)](#), who show that dealer market-making activities, rather than speculative short selling, contribute more to bond borrowing demand in a broad cross-section of corporate bonds.

Having established that dealers drive bond borrowing demand through liquidity provision in the issuance aftermarket, we investigate whether this channel extends upstream to the primary market. Since underwriters are often the same dealers providing the bulk of aftermarket liquidity, they have an incentive to allocate newly issued bonds to investors who participate in securities lending. This strategy ensures a readily available pool of lendable supply when dealers lack the inventory to fill customer purchase orders. Using transaction-level primary market allocation data for insurance companies, we find that insurers engaged in securities lending are significantly more likely to receive allocations. This advantage is amplified for offerings with strong bookbuilding demand, measured by the yield compression between initial price talk and final pricing ([Wang, 2021](#); [Hotchkiss, Wang, and Zhao, 2026](#); [Wang and Wu, 2026](#)). In our most stringent specification with bond offering and insurer $\times$ quarter fixed effects, lending insurers are 0.25 percentage points more likely to receive an allocation in high-bookbuilding-demand offerings, a 10% increase relative to the unconditional mean.

Complementary evidence from open-end bond mutual funds corroborates these results: funds engaged in securities lending are more likely to hold newly issued bonds in their delivery-quarter-end portfolios, again most strongly for high-bookbuilding-demand offerings. Because a quarter-end holding can reflect a secondary market purchase as well as a primary market allocation, we sharpen the proxy by restricting attention to offerings that settle close to the quarter end, where the holding is more likely to capture the primary market allocation, and recover the same pattern. We further exploit novel position-level disclosures from the SEC’s Form N-PORT, in which funds report whether each individual bond they hold is currently on loan, and confirm that lending funds in fact lend out their newly issued bonds more than their other holdings of the same issuer, most strongly for high-bookbuilding-demand offerings. These patterns are consistent with underwriters internalizing the aftermarket benefits of securities lending in their allocation decisions.

We acknowledge an empirical limitation in drawing inferences from the allocation-level results. Because we lack access to bookbuilding records, we do not observe the orders that investors submit;

instead, we observe realized primary market allocations, which are an equilibrium outcome of investor demand and underwriter allocation preferences. Underwriters do, however, exercise considerable discretion in setting primary market allocations. Private discussions with an industry practitioner in fixed-income underwriting indicate that allocations are determined by manually reviewing investor orders rather than through any mechanical or algorithmic rule; realized allocations therefore reflect underwriters' choices and not merely the size of investors' orders. This discretion is what permits underwriters to act on the incentive we describe. Whichever motive dominates, realized lender allocations place the bonds with investors willing to lend, and it is this lendable supply that supports dealers' liquidity provision once secondary market trading begins.

The allocation patterns carry significant implications for bond issuers and the quality of the issuance aftermarket. Offerings with larger allocations to lending investors exhibit greater aftermarket lendable supply and more active bond borrowing from dealers. These lending conditions are associated with more favorable issuance terms: increases in lender allocation in the primary market are associated with reductions in both offering yield spreads and underpricing. To address the concern that allocation decisions are correlated with issuer fundamentals, we confirm the pricing results using an ex-ante measure of latent lender demand, constructed from the lending propensity of the investors who hold the bond's maturity-and-rating segment while excluding the issuing firm's own bonds. In the secondary market, greater securities lending activity in the aftermarket is linked to an improvement in liquidity and healthier post-issuance price formation. Taken together, the evidence indicates that securities lending is a fundamental mechanism supporting a well-functioning trading environment in OTC markets, one that underwriters facilitate through strategic primary market allocation decisions with tangible benefits for issuer financing costs and aftermarket quality.

Related literature. Our paper contributes to three strands of the literature. First, we contribute to the literature on bookbuilding and the allocation of security offerings. Under canonical views of bookbuilding, primary market allocations reward investors for revealing information ([Benveniste and Spindt, 1989](#); [Hanley, 1993](#); [Cornelli and Goldreich, 2001](#)), and allocations also reward clients who generate other revenue for the underwriter ([Loughran and Ritter, 2002](#); [Reuter, 2006](#); [Nimalendran, Ritter, and Zhang, 2007](#); [Goldstein, Irvine, and Puckett, 2011](#); [Jenkinson, Jones, and Suntheim, 2018](#)). Studies of corporate bond offerings confirm that both information production and trading relationships shape allocations and underpricing ([Cai, Helwege, and Warga, 2007](#); [Nikolova, Wang,](#)

and Wu, 2020; Wang, 2021). We document a novel allocation motive that arises when the underwriter is also the aftermarket liquidity provider: allocations secure the lendable supply that underwriters can tap into to provide liquidity once secondary market trading begins. This motive is particularly relevant in over-the-counter markets, in which dealer desks face inventory constraints for trade intermediation. Our evidence also relates to work on how underwriters manage aftermarket inventory in corporate bond offerings. Bessembinder, Jacobsen, Maxwell, and Venkataraman (2022) document that underwriters overallocate bonds when they anticipate weak aftermarket demand. Most bond offerings, however, are heavily oversubscribed (Siani, 2026). We show that when there is an anticipated strong aftermarket trading demand, primary market allocations tilt toward lending investors, who provide the lendable supply from which dealers borrow to fill customer purchase orders in the secondary market.

Second, we extend the literature on corporate bond securities lending, an area that remains relatively underexplored compared to its equity counterpart (Bessembinder, Spatt, and Venkataraman, 2020). Prior studies have focused on whether bond short sellers are informed at the bond and aggregate market levels (Asquith, Au, Covert, and Pathak, 2013; Hendershott, Kozhan, and Raman, 2020; Duong, Gorbenko, Kalev, and Tian, 2025). Goyal, Nozawa, and Qiu (2026) show that dealers' market-making activity, rather than customers' speculative trading, accounts for the bulk of securities lending in the corporate bond market. We confirm this insight in the issuance aftermarket, where customer purchase demand and limited secondary market supply create acute inventory pressures for dealers. We further provide novel evidence that the liquidity provision incentives faced by underwriters shape their primary market allocation decisions, which are themselves a key source of returns for bond investors given the prevalence of underpricing.

Third, we contribute to the emerging literature on the securities lending activity of financial market participants. Recent studies in the equity lending market, largely built on mutual fund position-level securities lending disclosures, relate mutual funds' equity lending decisions to concentrated lender bases (Dong and Zhu, 2024), voting rights (Li and Zhu, 2025), information acquisition (Honkanen, 2025), and non-pecuniary preferences (Wang, 2026). In the corporate bond lending market, Chen, Tran, and Wang (2026) show that securities lending earns bond funds extra income in calm times but becomes a source of fragility during large redemptions. The existing literature largely focuses on how institutions decide to lend portfolio positions. We show that securities lending participation

by corporate bond investors also improves their access to the primary market, where underpricing makes allocations a valuable source of returns.

The rest of the paper is organized as follows. Section 2 describes the data and sample construction. Section 3 documents securities lending dynamics in the issuance aftermarket. Section 4 examines primary market allocation to lending investors. Section 5 analyzes the consequences for bond issuance outcomes and secondary market quality. Section 6 concludes.

2 Data

2.1 Data sources

We construct our sample from several data sources. Securities lending data on U.S. corporate bonds come from S&P Global (previously IHS Markit). S&P collects daily metrics on the securities lending market from numerous large custodians, brokers, and lending agents, including the number and value of corporate bonds on loan, the number and value of corporate bonds available to borrow, and the indicative loan fee. We define the daily borrowing demand of a corporate bond as the daily quantity of bonds on loan scaled by amount outstanding. Lendable supply is the quantity of bonds available for lending scaled by amount outstanding. Loan fee is the (annualized) indicative cost of borrowing estimated by S&P. We match the S&P Global data with the Mergent Fixed Income Securities Database (FISD) to obtain corporate bond characteristics. We include in our sample U.S. corporate bonds (i.e., those with FISD bond type CDEB or USBN) denominated in U.S. dollars, and exclude bonds that are convertible, perpetual, exchangeable, puttable, or have a floating coupon rate. We also exclude bonds with an at-issue maturity of less than one year, as these are considered money market instruments. We obtain the credit ratings of each new bond issue from the FISD ratings dataset, and map them onto a numerical scale such that rating AAA is 1, rating AA+ is 2, etc. A corporate bond is often rated by multiple rating agencies, and we use the rating issued by S&P as our main rating measure. If S&P does not issue a rating for the newly issued bond, we use Moody's rating; if neither S&P nor Moody's issues a rating, we use the rating from Fitch. In some analyses, we use secondary market activities of seasoned peer bonds issued by the same parent firm as the newly issued bond. We map the new bond issue to its parent firm in Compustat using the

bond-to-firm mapping file provided by [Fang \(2025\)](#).

Corporate bond transaction data come from the academic version of Trade Reporting and Compliance Engine (TRACE) provided by the Financial Industry Regulatory Authority (FINRA). The TRACE dataset reports the time, price, and quantity of all over-the-counter (OTC) bond trades reported by dealers, as well as the trade direction (from the perspective of the reporting party) and the counterparty type (customer or another dealer). The academic version of TRACE that we use also includes masked identifiers for the dealer reporting each transaction, allowing us to compute granular dealer-level metrics on bond trading activity and dealer inventory positions. The academic version of TRACE becomes available from FINRA with a 36-month delay from the time of transaction reporting, and our academic TRACE data include bond transactions up to the end of 2022. We follow the literature ([Dick-Nielsen, 2014](#); [Dick-Nielsen and Poulsen, 2019](#)) and clean the academic TRACE dataset by removing trades with erroneous information.

We account for settlement date differences when matching the TRACE bond transactions data to the securities lending data from S&P Global. The securities lending market has same-day (T+0) settlement, while the U.S. corporate bond market does not. Before September 5, 2017, the settlement cycle in the U.S. was T+3, meaning that the bonds in a transaction were delivered three days after the transaction date. Between September 5, 2017, and May 24, 2024, the settlement cycle was T+2. Since May 28, 2024, the settlement cycle has been T+1. Because our sample ends in 2022, we shift the securities lending record date backward by three trading days before September 5, 2017, and by two trading days from September 5, 2017, through the end of the sample ([Barardehi, Da, Dixon, and Wang, 2025](#)).

Parts of our analysis focus on primary market allocations to bondholders. To this end, we obtain granular data for two major groups of institutional investors: insurance companies and mutual funds. We source quarterly bond portfolio holdings, transactions, and individual insurers' financial statements from the S&P Capital IQ Pro platform. This platform aggregates data from statutory filings submitted to the National Association of Insurance Commissioners (NAIC).

To identify insurers' engagement in securities lending, we use the item "Securities Lending: Gross Investment Holding" from the NAIC Summary Investment Schedule.¹ Because this specific

¹This item corresponds to the "Gross Investment Amount" for securities lending reported in the annual statutory filings' Summary Investment Schedule.

reporting item was introduced in 2011, our analysis begins in 2012 to accommodate the use of lagged insurer securities lending activity in our specifications.

For open-end fixed-income mutual funds, we obtain quarterly portfolio holdings and fund characteristics from Morningstar Direct. To identify mutual funds' engagement in securities lending, we download and process various regulatory filings from the SEC's EDGAR repository. Our identification strategy adapts to the evolution of the SEC's investment company reporting regime over our sample period. In the pre-2019 period, we rely on Form N-SAR, a semi-annual report filed by registered investment companies. Item 70Q of Form N-SAR asks whether the registrant made loans of portfolio securities during the reporting period, providing a binary fund-level indicator of securities lending participation. We match each fund-quarter observation to the most recent N-SAR filing within the preceding year. Following the SEC's modernization of investment company reporting, Form N-SAR was discontinued in 2018 and replaced by new reporting forms. For the post-2018 period, we primarily use Form N-PORT, a monthly portfolio holdings report in which funds disclose, at the individual position level, whether each security is currently on loan. We classify a fund as a securities lender if it reports any positions on loan during the quarter. When Form N-PORT filings are unavailable for a given fund-quarter observation, we supplement our identification with Form N-CEN, an annual census report in which funds disclose aggregate securities lending income; we classify a fund as a lender if it reports positive securities lending income during the reporting period.

We also collect data on primary market demand for new bond offerings. To communicate initial pricing information to prospective investors during the bookbuilding process, underwriters typically release a series of pricing updates that include the initial price talk (i.e., preliminary price range), revised price guidance, and final pricing terms. Primary market demand is often reflected in these pricing updates, as underwriters adjust the pricing terms in response to investor demand. A common proxy for primary market demand during the price formation process is "compression", defined as the difference in yields between the initial pricing and the final pricing of the new bond issue ([Wang, 2021](#)). We hand-collect data on pricing updates and the magnitude of compression for our sample bond offerings from Bloomberg. As noted by [Wang \(2021\)](#), data coverage on pricing updates in Bloomberg is limited, and coverage has improved significantly since 2016.

2.2 Summary statistics

Our final sample covers the period from 2012 to 2022. After applying the aforementioned filters, we are left with 11,640 unique corporate bond issues from 1,909 unique parent firms, of which 8,045 are investment-grade and 3,595 are high-yield. We cross-sectionally winsorize all continuous variables at the 1st and 99th percentiles. Detailed definitions of all variables used in the paper are provided in Table [A1](#).

Table [1](#) reports the summary statistics of the key variables used in our analysis. Panel A presents the bond-day level variables used in our analysis of aftermarket securities lending dynamics. This sample covers the first 20 trading days following bond issuance settlement. The average daily change in bond loan quantity (Δ On Loan %) is 0.023 percentage points, with considerable variation (standard deviation of 0.486). In levels, the average bond has 1.514% of its amount outstanding on loan, though the distribution is right-skewed: the median is 0.886% while the 75th percentile is 2.029%. Average lendable supply is substantially larger at 18.754% of amount outstanding, indicating that available supply far exceeds actual borrowing demand. The median loan fee is 38 basis points. Secondary market trading in the issuance aftermarket is economically meaningful, with daily turnover averaging 1.794% of amount outstanding. This activity reflects the trading that characterizes the period immediately following bond issuance, as new bondholders establish positions and dealers intermediate customer order flow.

Panel B reports the insurer allocation level variables. The sample consists of over 11.3 million insurer-bond pair observations, representing all sample insurers with the potential to receive a primary market allocation for each bond offering. The unconditional probability of receiving an allocation is 2.4%. Among these insurer-bond pairs, 11.2% involve insurers classified as engaged in securities lending.

Panel C reports the mutual fund allocation level variables. As we do not observe mutual fund trading activity, bond allocations are proxied by the appearance of the new bond offering in the mutual fund's portfolio holdings at the end of the quarter in which the bond settles. The sample consists of nearly 10 million fund-bond pair observations that have an allocation potential. Mutual funds have a higher unconditional allocation probability of 4.204% compared to insurers, likely because some of these holdings reflect secondary market purchases in addition to primary market allocations. Among these fund-bond pairs, 27.2% involve funds identified as engaged in securities

lending.

Panel D presents the issuance-level variables. On average, insurers receive 11.027% of the total offering amount, of which 3.309 percentage points are allocated to lending insurers and 7.718 percentage points to non-lending insurers. Lending insurers thus account for approximately 30% of total insurer allocations (3.309 of 11.027 percentage points). In the aftermarket, the average bond has 18.636% lendable supply and 1.468% on loan. In our sample, the median offering yield spread is 145 basis points and the median underpricing is 19.2 basis points. The typical issue is approximately \$700 million in size ($e^{6.551}$), with a maturity of around 8 years ($e^{2.085}$) and a credit rating near BBB (mean rating of 8.813). Rule 144A offerings constitute approximately 31% of the sample, while shelf-registered (Rule 415) offerings constitute approximately 43%. Pre-offering institutional ownership of the issuer's seasoned bonds is substantial: mutual funds hold an average of 12.7% and insurers hold 22.2% of the issuing firm's outstanding bonds.

3 Securities Lending Dynamics in the Issuance Aftermarket

We begin our empirical analysis by documenting the dynamics of secondary market trading and securities lending in the corporate bond issuance aftermarket. We provide evidence that borrowing demand for newly issued bonds in the securities lending market is primarily driven by dealers' liquidity provision in the post-issuance secondary market.

3.1 Stylized Facts

Figure 1 plots the evolution of customer trading volume and the number of requests for quotes over the first 24 months following bond issuance. Both measures of secondary market activity are concentrated in the earliest months. Average customer trading volume approaches 40% of amount outstanding in the issuance month, falls sharply to approximately 12% by month one, and continues to decline before stabilizing around 5 to 6% by the end of the first year. The number of requests for quotes is likewise highest in the issuance month, at roughly 2,350, before easing to approximately 2,000 by month two. Taken together, these patterns confirm that the issuance aftermarket is a period of unusually active trading, and motivate our decision to define the aftermarket sample as the first 20 trading days following issuance settlement. We define the aftermarket window relative

to the settlement date (delivery date) rather than the offering date because securities lending is not accessible before physical delivery of the bonds occurs.

Accompanying this surge in trading activity, newly issued bonds experience a sharp increase in borrowing demand in the securities lending market. Figure 2 plots the raw and issuer-adjusted on-loan quantity over the first 20 trading days following issuance settlement for the newly issued bonds. We construct the issuer-adjusted measure by subtracting the contemporaneous average on-loan quantity (scaled by amount outstanding) of the issuing firm's outstanding peer bonds from the raw on-loan percentage of the new bond issue, thereby isolating the component of lending market activity that is specific to the newly issued bond rather than reflecting firm-wide securities lending conditions. Raw on-loan quantity rises from approximately 1.15% of issue size on the settlement date to 1.50% by the next trading day and remains elevated throughout the 20-day window, indicating that heightened borrowing demand for newly issued bonds is not a transient settlement-day phenomenon.²

Two additional pieces of evidence, presented in the Appendix, suggest that the dynamics in Figure 2 are driven by the demand side of the securities lending market. In contrast to the elevated borrowing demand documented above, the supply side of the lending market does not show a comparable increase. Figure A2 shows that the issuer-adjusted lendable supply of new issues is modestly below that of the issuing firm's existing bonds throughout the post-issuance window and gradually converges toward parity as institutional investors build their positions. Similarly, Figure A3 shows that the issuer-adjusted loan fee is briefly elevated on the settlement date but rapidly normalizes to near zero within the first few trading days. Elevated borrowing demand alongside stable supply and fees suggests that demand-side pressure is the primary force driving securities lending dynamics in the issuance aftermarket.

A natural candidate for the source of this borrowing demand is dealer liquidity provision. The illiquid nature of the OTC corporate bond market, combined with the limited secondary market supply from buy-and-hold investors in newly issued bonds, leaves dealers with limited inventory to fill customer purchase orders. Figure A4 further shows that the cumulative customer order flow imbalance (customer purchases net of sales) rises steadily over the 20-day window since issuance

²Appendix Figure A1 extends the horizon to 24 months. On-loan quantity continues to rise after the 20-day window, plateaus between months 4 and 10, and then declines below its issuance-month level by month 24. Dealer negative inventory peaks earlier and falls steadily after month 2. The joint reversal indicates that the elevated borrowing demand is concentrated around issuance and is consistent with dealer intermediation through establishing negative inventory.

settlement. The inventory available for intermediation may also be spread unevenly across dealers, leading to dealer inventory segmentation. For example, insurers who flip their allocations tend to sell to dealers other than the underwriters ([Nikolova and Wang, 2026](#)); as such, the dealers receiving customer purchase orders are often not the dealers holding inventory.

In principle, secondary market dealers may employ three strategies to accommodate customer purchase orders. The first is to search for customers willing to sell their recently acquired bond holdings and match them with prospective buyers. However, this search-and-match process is both costly and time-consuming, as existing bondholders of the new issue, many of whom pursue buy-and-hold strategies, may be reluctant to liquidate their newly acquired positions. [Siani \(2026\)](#) documents that most primary market investors who receive bond allocations rarely participate in secondary market trading, contributing to limited sell-side liquidity in the secondary market.

The second strategy is to source bonds through the interdealer network. However, the issuance aftermarket is dominated by customer transactions with limited interdealer trading activity, largely because bonds are allocated directly to customers in the primary market rather than retained by dealers. Even among dealers who do hold inventory, strategic considerations may further limit interdealer trading. In anticipation of customer purchase demand, dealers with positive inventory positions have an incentive to retain their scarce bond holdings rather than sell to competing dealers, as doing so would strengthen a rival dealer's ability to serve customers ([An, 2022](#)). This reluctance to share inventory can create segmentation in the interdealer market, where some dealers hold positive inventory positions while others lack the inventory to fill customer purchase orders and cannot source bonds from their peers. [Figure A5](#) corroborates this argument. Panel A shows that the interdealer share of trading volume is concentrated near zero across post-issuance bond-days, confirming that interdealer activity is thin. Panel B shows that even when interdealer trades do occur, they do little to relieve dealers' customer-facing imbalances: on dealer-bond-days when customers are net buyers, interdealer purchases offset only 26.3% of the aggregate absolute customer order imbalance, and on dealer-bond-days when customers are net sellers, interdealer sales offset only 20.5%, with a further 9.2% and 7.3% of interdealer volume, respectively, moving in the direction that worsens the imbalance.

Third, dealers can source bonds from the securities lending market. This involves borrowing securities from buy-and-hold investors who, while reluctant to sell their positions outright (possibly

due to their long investment horizons), are willing to lend them for a fee. Dealers then deliver the borrowed bonds to fulfill customer purchase orders, effectively using the lending market as a source of “just-in-time” inventory. When customer demand exceeds what dealers can source through their trading network, dealers sell more of the bond than they hold, accumulating negative inventory positions (states in which a dealer has cumulatively sold more of a bond than it has purchased) that they must cover by borrowing in the securities lending market. Consistent with this liquidity provision view, [Goyal, Nozawa, and Qiu \(2026\)](#) show that dealer market-making, rather than customer speculation, is the primary driver of bond borrowing across the corporate bond market. [Macchiavelli and Zhou \(2022\)](#) further note that corporate bond dealers are active participants in the securities finance market, securing 40% of their collateralized funding from this source. We argue that dealers rely on the securities lending market to facilitate liquidity provision, particularly in the issuance aftermarket, where dealers hold little inventory of the new bond relative to the purchase orders they receive and the alternative (failing to deliver bonds) carries both reputational costs and regulatory penalties.

Figure 3 provides descriptive evidence of this channel by plotting the raw and issuer-adjusted aggregate negative inventory positions of dealers in the newly issued bond. Dealers’ negative inventory rises monotonically throughout the post-issuance window, increasing from approximately 1.20% of issue size on the settlement date to nearly 1.60% by trading day 20 in raw terms, with the issuer-adjusted component climbing from roughly 0.15% to about 0.5%. The magnitude and trajectory of these negative inventory positions closely track the on-loan dynamics documented in Figure 2, suggesting a link between dealers’ short positioning and the demand to borrow bonds that we examine formally below.

Furthermore, the tight connection between dealer negative inventory and borrowing demand is already visible before the settlement date. Secondary market trading in newly issued bonds typically begins on the offering date, several days before physical delivery occurs on the settlement date. During this pre-settlement window, dealers accommodate customer purchase orders and accumulate negative inventory positions, but cannot yet cover these positions through the securities lending market because the bonds have not been physically delivered. Figure 4 relates dealer negative inventory accumulated over the pre-settlement period to securities lending demand observed on the settlement day, the first date on which securities lending becomes available. Panel A plots the

extensive margin: bonds with more dealers holding negative inventory during the pre-settlement period exhibit a greater number of open loan contracts on the settlement day. Panel B plots the intensive margin: bonds with greater aggregate pre-settlement dealer negative inventory, measured as a percentage of issue size, exhibit higher on-loan quantities on the settlement day. Both panels reveal a strong positive association, consistent with dealers borrowing bonds to cover negative inventory positions built up during the pre-settlement trading period. This pre-settlement evidence reinforces the view that dealer liquidity provision is the primary driver of borrowing demand, as the negative inventory that accumulates before delivery translates directly into lending market activity once the bonds become available for borrowing.

3.2 Dealer Negative Inventory and Bond Lending

We now address whether the observed increase in bond borrowing demand post-issuance is driven by dealer liquidity provision in the secondary market. Under the liquidity provision hypothesis, dealers who fill customer purchase orders in excess of their inventory accumulate negative inventory positions that must be covered in the securities lending market, generating a direct link between dealer inventory and bond borrowing demand.

We test this hypothesis at the bond-day level by regressing measures of bond borrowing on dealers' negative and positive inventory positions. We examine two margins. At the extensive margin, we test whether the number of dealers holding negative inventory positions maps onto the number of open bond loan contracts. This test offers a particularly granular identification of the dealer liquidity provision channel: if each negative-inventory dealer independently borrows bonds to cover its position, we should observe a close correspondence between the count of negative-inventory dealers and the count of outstanding loans, a pattern that is difficult to reconcile with alternative explanations such as speculative short selling. At the intensive margin, we test whether the aggregate magnitude of dealers' negative inventory (as a percentage of issue size) predicts the total quantity of bonds on loan.

For each margin, we estimate both a first-difference specification and a level specification. The first-difference specification takes the form:

$$\Delta Y_{i,t+1} = \alpha + \beta_1 \Delta \text{NegInv}_{i,t+1} + \beta_2 \Delta \text{PosInv}_{i,t+1} + \gamma' \mathbf{X}_{i,t} + \delta_t + \mu_i + \varepsilon_{i,t}, \quad (1)$$

where $\Delta Y_{i,t+1}$ is either $\Delta N(\text{Loan})_{i,t+1}$, the daily change in the number of open bond loans for bond i , or $\Delta \text{On Loan}_{i,t+1}$, the daily change in the percentage of the bond on loan; $\Delta \text{NegInv}_{i,t+1}$ and $\Delta \text{PosInv}_{i,t+1}$ are the daily changes in negative and positive inventory, measured either as the number of dealers (extensive margin) or as a percentage of issue size (intensive margin); $\mathbf{X}_{i,t}$ is a vector of lagged bond-day controls including the level of on-loan quantity, lendable supply, the loan fee, the bond return, and turnover; and δ_t and μ_i denote date and bond offering fixed effects, respectively. The corresponding level specification relates the next-day level of the outcome to the current-day levels of the inventory variables and controls. The sample covers the first 20 trading days following issuance settlement. Standard errors are two-way clustered at the bond and date level.

Table 2 presents the results. Columns (1) and (2) report the extensive-margin estimates. In the first-difference specification of Column (1), the coefficient on $\Delta N(\text{NegInv Dealer})$ is 0.935 ($t = 45.27$): each additional dealer entering a negative inventory position on a given day is associated with approximately one additional open bond loan. The coefficient on $\Delta N(\text{PosInv Dealer})$ is -0.243 ($t = -13.61$), indicating that when more dealers accumulate long positions, the number of new loans declines, consistent with reduced need for borrowing when dealers can source bonds from their own inventory. The level specification in Column (2) confirms this pattern: each negative-inventory dealer on day t is associated with 1.046 outstanding loans on day $t + 1$ ($t = 25.17$), while each positive-inventory dealer is associated with 0.255 fewer loans ($t = -8.46$). The near-unity coefficients on the negative-inventory dealer count suggest an approximately one-to-one mapping between the number of negative-inventory dealers and the number of open loan contracts.

Columns (3) and (4) report the intensive-margin estimates. In Column (3), the coefficient on ΔNegInv is 0.479 ($t = 65.42$), indicating that a one percentage point increase in dealers' aggregate negative inventory is associated with a 0.479 percentage point increase in on-loan quantity. In contrast, the coefficient on ΔPosInv is economically small at -0.031 ($t = -14.24$). A one-standard-deviation increase in ΔNegInv (0.327 percentage points) corresponds to a 0.157 percentage point increase in on-loan quantity, roughly seven times the unconditional mean daily change of 0.023 percentage points. The level specification in Column (4) delivers similar conclusions: the coefficient on NegInv is 0.190 ($t = 15.02$), while PosInv enters with a coefficient of -0.033 ($t = -6.29$). Across both margins, dealers' negative inventory positions are the dominant driver of bond borrowing demand in the issuance aftermarket, while positive inventory positions play a comparatively minor

role. This evidence broadly aligns with [Goyal, Nozawa, and Qiu \(2026\)](#), who identify dealers, rather than speculative customers, as the more dominant securities borrowers in the corporate bond market.

A natural question is whether the cost of borrowing bonds in the securities lending market erodes dealers' profits from liquidity provision. Our evidence suggests it does not. As reported in Table 1, the median (annualized) loan fee is 38 basis points, implying a cost of roughly 3.0 basis points over the 20-day aftermarket window. By comparison, Figure A6 shows that dealers charge customers a spread of approximately 25 to 30 basis points per transaction on purchases and 12 to 16 basis points per transaction on sales.³ The revenue from a single customer transaction thus exceeds the lending cost of carrying a borrowed position for the entire aftermarket period by an order of magnitude, making it profitable for dealers to source bonds through the securities lending market and earn market-making profits on customer trades.

A potential concern is that the estimated relationship between dealer inventory and bond borrowing demand reflects omitted firm-level factors, such as firm-wide information events that simultaneously drive both trading activity and borrowing demand across all of the firm's outstanding bonds. To address this concern, we conduct a placebo test that exploits within-firm cross-bond variation (Table A2 in the Appendix). If a firm-level shock is the true driver, it should generate correlated dealer inventory and borrowing demand across all of the firm's outstanding bonds, not just the newly issued one. Under our dealer liquidity provision hypothesis, by contrast, the link between inventory and borrowing demand is specific to the bond in which dealers are making markets.

In Column (1) of Table A2, we regress the change in bond loan demand of the newly issued bond on the change in dealer negative inventory in the issuing firm's peer bonds (existing bonds of the same firm that were outstanding at the time of the new issuance, value-weighted by amount outstanding). The coefficient is economically negligible and statistically insignificant (0.000, $t = 0.07$). Dealer inventory activity in the firm's existing bonds does not predict borrowing demand for the newly issued bond. Column (2) performs the reverse test, regressing the change in peer bond loan demand on the change in dealer negative inventory in the newly issued bond; the coefficient is again indistinguishable from zero (-0.000 , $t = -0.02$). These null results establish that the dealer liquidity provision channel

³Following [O'Hara and Zhou \(2021\)](#), the transaction cost for each customer trade is computed as $\ln(p^{\text{trade}}/p^{\text{benchmark}}) \times (-1) \times \text{trade_side}$, where $p^{\text{benchmark}}$ is the price of the most recent interdealer trade preceding the customer trade, within five calendar days. The sign adjustment makes the measure positive when dealers buy below or sell above the benchmark.

operates at the level of the individual bond, not the firm, and alleviate concerns that unobserved firm-level shocks confound the baseline estimates.

Finally, we verify that the results are robust to measuring (implied) dealer market-making activity through aggregate customer order flows rather than inventory positions directly. Table A3 in the Appendix reports estimates from a specification that replaces dealer inventory variables with customer buy and sell volumes. The coefficient on Customer Buy is positive at 0.153 ($t = 48.41$), while the coefficient on Customer Sell is negative at -0.097 ($t = -34.52$). This asymmetry is consistent with dealers borrowing bonds to fill customer purchase orders in excess of their inventory: if speculative short sellers were the primary borrowers, we would expect bond loan demand to increase with customer selling, the opposite of what we observe. These findings again corroborate Goyal, Nozawa, and Qiu (2026), who document a similar relationship between on-loan quantities and customer order flows in the broader corporate bond market. Comparing the two approaches, the dealer negative inventory coefficient of 0.479 in Table 2 implies a much tighter association with on-loan quantity than the customer buy coefficient of 0.153, as inventory positions directly capture the dealer short positions that must be covered through the lending market.

Taken together, the results in this section establish that securities lending demand for newly issued corporate bonds is primarily driven by dealers filling customer purchase orders with limited inventory on hand. The tight correspondence between dealers' negative inventory positions and bond borrowing demand, both at the extensive margin (number of dealers and loans) and at the intensive margin (aggregate quantities), provides direct evidence of liquidity-motivated bond lending. A natural next step is to consider whether these dynamics have implications for the primary market: if dealers anticipate the need to borrow bonds post-issuance, they may have an incentive to place bonds with investors who are willing to lend them. We explore this possibility in the next section.

4 Primary Market Allocation to Lending Investors

Having established that dealers drive bond borrowing demand through liquidity provision in the issuance aftermarket, we now investigate whether this channel extends upstream to the primary market. Bookbuilding gives underwriters discretion over who receives a new issue, and the literature has documented two prominent motives behind such discretion: rewarding investors who reveal

pricing-relevant information (Benveniste and Spindt, 1989; Cornelli and Goldreich, 2001) and rewarding clients who generate other business revenue for the underwriter (Loughran and Ritter, 2002; Jenkinson, Jones, and Suntheim, 2018). Both motives are also shown to operate in corporate bond offerings (Nikolova, Wang, and Wu, 2020). We analyze a novel motive when underwriters, who are frequently the same dealers that provide aftermarket liquidity, anticipate the need to borrow bonds from allocated investors for aftermarket trade intermediation: do they preferentially allocate bond offerings to investors who participate in securities lending? Such a pattern would be consistent with underwriters internalizing the benefits of securities lending for aftermarket liquidity provision: by directing bonds to investors willing to lend, underwriters ensure a readily available source of borrowable securities when their inventory falls short of customer purchase orders post-issuance. This argument presumes that underwriters can steer bonds toward particular investors at their own discretion, and institutional practice supports the premise: private discussions with an industry practitioner reveal that primary market bond allocations are not determined by any mechanical algorithm; instead, underwriting desks work through the submitted investor orders line by line and decide each allocation on a case-by-case basis. Our tests control for the standard proxies for the two established motives, information production and dealer relationship strength, and ask whether securities lending participation predicts allocations over and above them.

4.1 Allocation to Insurance Companies

We first test the primary market allocation hypothesis using transaction-level data on primary market allocations to insurance companies from NAIC regulatory filings, obtained through S&P Capital IQ Pro. Insurance companies are among the largest institutional investors in the corporate bond market and are required to report their individual bond transactions, allowing us to identify the specific bonds allocated to each insurer in the primary market. Following Nikolova, Wang, and Wu (2020), we classify an insurer’s bond purchase as a primary market allocation if the acquisition date coincides with the bond’s offering date and the transaction price is within \$0.01 per \$100 par value of the offering price, accommodating minor reporting discrepancies in the regulatory filings. We identify individual insurers’ securities lending engagement using the NAIC Summary Investment Schedule provided in Capital IQ Pro, classifying an insurer as a lender if it reports positive “Securities Lending: Gross Investment Holding” during the year prior to the offering.

To focus the analysis on insurers who could plausibly receive an allocation from the underwriter, we define the concept of allocation potential. An insurer has allocation potential for a given bond offering if it received at least one primary market allocation from any of the offering's lead underwriters during the four quarters preceding the offering. This restriction ensures that the comparison group consists of insurers with established underwriter relationships, rather than the universe of all insurance companies. After applying this filter, the insurer allocation panel comprises 11,311,942 insurer-bond pairs (Table 1, Panel B). The unconditional probability of receiving an allocation is 2.437%, and approximately 11.2% of insurer-bond observations involve a lending insurer.

We test whether lending insurers are more likely to receive primary market allocations, and whether this advantage is amplified in offerings with strong bookbuilding demand, where underwriters' anticipated need for aftermarket bond borrowing is greatest. We estimate the following linear probability model:

$$1[\text{Allocation}]_{i,j} \times 100 = \beta_1 1[\text{Lending Insurer}]_j + \beta_2 1[\text{Lending Insurer}]_j \times 1[\text{High Bookbuilding Demand}]_i + \gamma' \mathbf{X}_{i,j} + \delta_i + \mu_{j,t} + \varepsilon_{i,j}, \quad (2)$$

where $1[\text{Allocation}]_{i,j}$ is an indicator equal to one if insurer j receives an allocation in bond offering i , scaled by 100 for ease of interpretation; $1[\text{Lending Insurer}]_j$ indicates whether the insurer participates in securities lending; $1[\text{High Bookbuilding Demand}]_i$ indicates offerings with pricing compression above the 75th percentile within the offering quarter, where compression measures the yield decline from initial price talk to final pricing and proxies for strong bookbuilding demand;⁴ $\mathbf{X}_{i,j}$ is a vector of controls including the insurer's information production (portfolio share in the issuer's industry) and dealer relationship strength (the insurer's share of the lead underwriter's total trading volume), both of which are critical determinants of bond primary market allocation documented by [Nikolova, Wang, and Wu \(2020\)](#), existing holdings of the issuer's outstanding bonds, insurer size, and insurer cash flows; and δ_i and $\mu_{j,t}$ denote bond offering and insurer $\times$ quarter fixed effects, respectively. Standard errors are clustered at the bond and offering quarter level.

⁴Compression data are hand-collected from Bloomberg. As noted by [Wang \(2021\)](#), Bloomberg's coverage of pricing updates is limited, and compression data are available for 6,974 of the 11,640 offerings in our sample. The mean (median) compression is 18.9 (18.8) basis points, with an interquartile range of 12.5 to 25.0 basis points.

The interaction between 1[Lending Insurer] and 1[High Bookbuilding Demand] is central to our empirical design. If underwriters allocate to lending investors to facilitate their own aftermarket liquidity provision, this incentive should be strongest when bookbuilding demand is high, as strong demand compresses offering yields and signals that customer buying pressure will persist into the secondary market.

Table 3 presents the extensive margin primary market allocation results for insurance companies. The dependent variable is $1[\text{Allocation}] \times 100$, an indicator for whether the insurer receives an allocation in the bond offering. Column (1) estimates the unconditional relation between securities lending participation and allocation probability with bond offering fixed effects. The coefficient on 1[Lending Insurer] is 0.541 ($t = 6.97$), indicating that lending insurers are 0.541 percentage points more likely to receive an allocation than non-lending insurers within the same bond offering. Relative to the unconditional allocation probability of 2.437 percentage points, this represents an economically significant 22.2% increase in the likelihood of receiving an allocation. For comparison, a one-standard-deviation increase in information production raises the allocation probability by 0.29 percentage points, while a one-standard-deviation increase in dealer relationship raises it by 2.16 percentage points. The lending effect thus sits between the two established allocation motives, larger than the information production channel and smaller than the relationship channel, and the substantially larger role of dealer relationships relative to information production in explaining primary market allocations mirrors prior work (Nikolova, Wang, and Wu, 2020).

Column (2) introduces the interaction with 1[High Bookbuilding Demand] while retaining bond offering fixed effects. The coefficient on the standalone 1[Lending Insurer] is 0.622 ($t = 8.82$), and the coefficient on $1[\text{Lending Insurer}] \times 1[\text{High Bookbuilding Demand}]$ is 0.264 ($t = 2.41$). The positive and statistically significant interaction indicates that the allocation advantage of lending insurers is amplified for offerings with strong bookbuilding demand. For high-bookbuilding-demand offerings, lending insurers enjoy a total allocation advantage of 0.886 percentage points ($0.622 + 0.264$), 36% of the unconditional mean.

Column (3) is our most demanding specification, including both bond offering fixed effects and insurer $\times$ quarter fixed effects. The insurer $\times$ quarter fixed effects absorb all time-varying insurer characteristics, including the standalone lending indicator, ensuring that identification comes

from within-insurer variation across bond offerings within the same quarter.⁵ The coefficient on $1[\text{Lending Insurer}] \times 1[\text{High Bookbuilding Demand}]$ remains statistically significant at 0.246 ($t = 2.32$). This estimate indicates that, holding constant the insurer's overall allocation propensity in a given quarter, lending insurers receive a 0.246 percentage point increase in allocation probability for offerings with high bookbuilding demand.⁶

Consistent with these allocation preferences, lending insurers are also markedly less likely to flip (quickly resell) their allocated bonds: they are about 3.3 percentage points less likely to flip within the first two days of trading (Table A5), consistent with a buy-and-hold orientation that lets them retain and lend the bonds rather than trade them. This lower flipping propensity, however, does not vary with bookbuilding demand; the interaction with $1[\text{High Bookbuilding Demand}]$ is small and statistically insignificant. This is consistent with flipping being a stable attribute of lending insurers (Nikolova and Wang, 2026) rather than a response to issuance conditions.

We do acknowledge an empirical limitation in interpreting these allocation-level results. Because we lack access to bookbuilding records, we do not observe the orders that investors submit; instead, we observe realized allocations, which are an equilibrium outcome of investor demand and underwriter allocation preferences. As discussed above, underwriters retain considerable discretion over allocations, working through submitted orders manually rather than applying any mechanical rule, so realized allocations embody underwriters' choices and do not merely reflect the size of the orders they receive on the book. Whichever motive dominates, the outcome relevant for the aftermarket is the same: primary market allocations reach investors willing to lend, and this lendable supply underpins dealers' liquidity provision once secondary market trading begins.

⁵We note that the coefficient estimate for dealer relationship declines substantially in Column (3). Dealer relationship is largely an insurer-specific attribute, so the insurer $\times$ quarter fixed effects absorb much of its variation. The shrinkage of the dealer relationship coefficient in the within-insurer analysis is consistent with the pattern in Nikolova, Wang, and Wu (2020).

⁶We also validate that this within-insurer allocation pattern aggregates up to the issuance level. In Table A4, we regress the composition of insurer allocations on the high-bookbuilding-demand indicator across offerings, controlling for the total allocation to insurers. High-bookbuilding-demand offerings direct a 2.03 percentage point larger share of total insurer allocation to lenders (Column 1), reflecting both a higher absolute allocation to lending insurers (Column 2) and a lower allocation to non-lenders (Column 3). Strong primary market bookbuilding demand thus shifts the allocation mix within the insurer group toward lending investors.

4.2 Allocation to Mutual Funds

We supplement the insurance company analysis with evidence from open-end fixed-income mutual funds. For these investors, we use quarter-end portfolio holdings from Morningstar as a proxy for allocation: a bond appearing in a fund’s portfolio at the end of the quarter in which it settles is treated as evidence that the fund received an allocation. We identify fund-level securities lending participation using the N-SAR form for the pre-2019 period, the N-PORT form from 2019 onward, and the N-CEN form as a fallback (see Section 2 for details). To define allocation potential, we identify each fund’s principal trading counterparties from SEC regulatory filings. Prior to June 2018, funds reported the ten entities with which they conducted the largest dollar volume of principal transactions on Form N-SAR (Item 22), filed semi-annually. Beginning in June 2018, the SEC replaced the N-SAR with the annual Form N-CEN, which reports the same information in Item C.17. For each fund-quarter observation, we match the fund to its most recent filing within one year, prioritizing N-CEN over N-SAR when both are available for the same period. A fund has allocation potential for a given bond offering if it reported any principal trading volume with at least one of the offering’s lead underwriters in any filing covering the four quarters preceding the offering.

An important caveat applies to this analysis. Unlike the insurance company data, where we observe actual primary market allocations, the mutual fund analysis relies on quarter-end portfolio holdings as a noisy proxy for allocation. A bond appearing in a fund’s holdings at the end of the settlement quarter may reflect a primary market allocation, a secondary market purchase, or both. The results should therefore be interpreted as suggestive, as the positive association between lending status and quarter-end holdings is consistent with two potential channels: lending funds may receive preferential primary market allocations from underwriters, or dealers may preferentially fill their secondary market orders, recognizing that these funds’ bond acquisitions contribute to lendable supply that facilitates dealers’ liquidity provision in future customer transactions.

To sharpen the proxy, we exploit variation in the timing of bond settlement relative to the quarter end. For bonds that settle just before the quarter end, the window for secondary market accumulation is short, making the quarter-end holding a more reliable indicator of a primary market allocation. We define near quarter-end offerings as bonds that settle within one trading day of the quarter end, where the one trading day allowance accommodates potential delays in booking the bond acquisition, and estimate the model separately on this subsample.

Table 4 presents the results. Column (1) reports the unconditional specification on the full sample with bond offering fixed effects. The coefficient on 1[Lending MF] is 1.117 ($t = 13.97$), indicating that lending funds are 1.117 percentage points more likely to hold newly issued bonds at the delivery quarter-end than non-lending funds, a 26.6% increase relative to the unconditional mean of 4.204%. Column (2) adds fund $\times$ quarter fixed effects and the compression interaction; the coefficient on 1[Lending MF] $\times$ 1[High Bookbuilding Demand] is 0.388 ($t = 4.38$).

Columns (3) and (4) restrict the sample to near quarter-end offerings. In Column (3), the coefficient on 1[Lending MF] is 1.295 ($t = 5.79$). In Column (4), the most saturated specification with fund $\times$ quarter fixed effects, the interaction coefficient rises to 0.896 ($t = 2.63$). Despite the limitations of the mutual fund allocation proxy, these patterns are broadly consistent with the insurance company findings and provide corroborating evidence that underwriters direct newly issued bonds toward lending investors.

4.3 Securities Lending of Newly Issued Bonds: Mutual Fund Position-Level Evidence

The SEC's modernization of investment company reporting introduced Form N-PORT, in which mutual funds disclose, at the individual position level, whether each security they hold is currently on loan. This granularity allows us to examine securities lending activities directly at the position level and validate whether lending mutual funds in fact lend out their newly issued bonds more than their other holdings. Position-level on-loan reporting begins with the introduction of Form N-PORT, so the sample for this analysis runs from the third quarter of 2019 through the end of 2022. Restricting the sample to lender funds, we estimate

$$1[\text{Loaned}]_{b,f,t} \times 100 = \beta 1[\text{New Issue}]_{b,f} + \gamma' \mathbf{X}_{b,t} + \theta_{f,t} + \lambda_{g,t} + \varepsilon_{b,f,t}, \quad (3)$$

where $1[\text{Loaned}]_{b,f,t}$ is an indicator equal to one if fund f reports its position in bond b as on loan in quarter t , scaled by 100; $1[\text{New Issue}]_{b,f}$ indicates whether the position is a newly issued bond, defined as a bond the fund held at its delivery quarter-end; $\mathbf{X}_{b,t}$ is a vector of bond controls including bond size, time to maturity, credit rating, and Rule 144A and Rule 415 status; and $\theta_{f,t}$ and $\lambda_{g,t}$ denote fund $\times$ quarter and firm $\times$ quarter fixed effects, respectively. The firm $\times$ quarter fixed effects

ensure that identification compares a fund’s newly issued and seasoned holdings of the same issuer within the same quarter.

Table 5 reports the results. In Column (1), newly issued positions are 0.342 percentage points more likely to be on loan than the fund’s other holdings ($t = 2.18$), a meaningful difference relative to the unconditional on-loan rate of roughly 5% in this sample. Column (2) partitions new issues by bookbuilding demand.⁷ The relation is concentrated among high-bookbuilding-demand offerings: positions in newly issued bonds from such offerings are 0.707 percentage points more likely to be on loan ($t = 2.29$), compared with 0.265 percentage points for other new issues ($t = 1.70$). This pattern mirrors the allocation results and connects them to realized lendable supply. The newly issued bonds most likely to appear on loan are precisely those from high-bookbuilding-demand offerings, where dealer inventory is most likely to fall short of aftermarket purchase orders.

Overall, the results in this section indicate that underwriters preferentially allocate bonds to investors who participate in securities lending, particularly when strong bookbuilding demand signals that dealers may need to borrow bonds to fill customer purchase orders in the issuance aftermarket, and that the bonds allocated to these investors subsequently enter the securities lending market, most strongly for the same high-bookbuilding-demand offerings. Securities lending participation thus emerges as a unique determinant of primary market allocation alongside the information and relationship channels emphasized in the bookbuilding literature. These allocation patterns raise a natural follow-up question: do they carry real consequences for the securities lending market, secondary market outcomes, and the pricing of new offerings? We turn to this question in the next section.

5 Securities Lending and Bond Issuance Outcomes

The preceding analysis establishes that underwriters preferentially allocate newly issued bonds to investors who participate in securities lending, and that this allocation advantage intensifies when primary market demand is strong. In this section, we investigate whether these allocation patterns carry real consequences for the securities lending market, the pricing of new offerings, and the quality of the post-issuance secondary market. We address this question by shifting the unit of

⁷High-bookbuilding-demand offerings are those with issuance compression above the 75th percentile within the quarter, mirroring the allocation analysis.

analysis from the investor-bond pair to the bond offering itself. For each offering, we collapse the daily aftermarket panel into issuance-level measures by averaging each daily variable over the first 20 trading days following issuance settlement, unless otherwise noted. All specifications include the same set of bond and issuer controls used throughout the paper, enumerated following Equation (4), with standard errors clustered at the bond level.

5.1 Primary Market Allocations and Aftermarket Securities Lending

We first test whether allocations to lending investors translate into improvements in securities lending conditions in the aftermarket. If the preferential allocation documented in the previous section serves to ensure a readily available supply in the securities lending market, we should observe that offerings with larger lender allocations exhibit both greater lendable supply and, when dealer borrowing demand is high, more active bond lending. We estimate the following specification at the bond offering level:

$$Y_i = \beta_1 \text{Lender Alloc}_i + \beta_2 \text{Non-Lender Alloc}_i + \gamma' \mathbf{X}_i + \alpha_f + \delta_t + \varepsilon_i, \quad (4)$$

where Y_i is an aftermarket securities lending outcome for bond offering i ; Lender Alloc_i is the total primary market allocation to lending insurers as a share of issue size; $\text{Non-Lender Alloc}_i$ is the corresponding share allocated to non-lending insurers; $\mathbf{X}_i$ is a vector of bond and issuer controls comprising $\log(\text{Issue Size})$, $\log(\text{Maturity})$, Issue Rating , $1[\text{Rule 144A}]$, $1[\text{Rule 415}]$, $\text{MF Ownership \%}$, $\text{Insurer Ownership \%}$, $\log(\text{Market Equity})$, Book-to-Market , and Leverage ; and α_f and δ_t denote firm and offering month fixed effects, respectively.

A more precise prediction is that lender allocations should facilitate liquidity-driven bond borrowing precisely when dealers face the greatest market-making pressure. When dealers accumulate large negative inventory positions to fill customer purchase orders in excess of their inventory, they need to borrow bonds from the securities lending market; allocations to lending investors should increase the sensitivity of on-loan quantities to dealers' negative inventory positions. To test this, we extend Equation (4) by interacting each allocation variable with NegInv_i , the average daily aggregate

negative dealer inventory position scaled by issue size over the first 20 trading days post-settlement:

$$Y_i = \beta_1 \text{Lender Alloc}_i + \beta_2 \text{Non-Lender Alloc}_i + \beta_3 \text{Lender Alloc}_i \times \text{NegInv}_i \\ + \beta_4 \text{Non-Lender Alloc}_i \times \text{NegInv}_i + \beta_5 \text{NegInv}_i + \gamma' \mathbf{X}_i + \alpha_f + \delta_t + \varepsilon_i. \quad (5)$$

In all interaction specifications, the constituent variables are demeaned prior to forming the interaction terms, so that the coefficients on the individual variables retain their interpretation as marginal effects evaluated at the sample mean.

Table 6 presents the results. The dependent variables are Aftermarket Lendable Supply (%), defined as the average daily quantity of bonds available to lend scaled by issue size over the first 20 trading days post-settlement, and Aftermarket On Loan (%), the average daily quantity of bonds on loan over the same window. All specifications include firm and offering month fixed effects.

Column (1) reports the relation between allocations and aftermarket lendable supply. The coefficient on Insurer Lender Allocation is 0.463 ($t = 16.36$): each additional percentage point of the offering allocated to lending insurers is associated with a 0.463 percentage point increase in aftermarket lendable supply. In contrast, the coefficient on Insurer Non-Lender Allocation is small and statistically insignificant (-0.025 , $t = -1.54$), indicating that allocations to non-lending investors do not expand the pool of lendable bonds in the aftermarket. A one-standard-deviation increase in Insurer Lender Allocation (3.430 percentage points) corresponds to a 1.588 percentage point increase in lendable supply, approximately 8.5% of the unconditional mean of 18.636%.

Column (2) examines on-loan quantity, augmenting the specification with the interactions between each allocation measure and dealer negative inventory. Consistent with the prediction that lender allocations should matter most when dealers face acute borrowing needs, the interaction between Insurer Lender Allocation and Negative Inventory is positive and significant (0.016, $t = 2.86$), confirming that the securities lending benefit of allocating to lenders is amplified when dealers face larger inventory shortfalls. The corresponding interaction for Insurer Non-Lender Allocation is insignificant (-0.004 , $t = -1.41$). Allocations to lending investors thus support the securities lending market by providing a pool of lendable bonds that is drawn upon precisely when dealers' borrowing demand is highest. The insignificant Insurer Non-Lender Allocation coefficients throughout confirm that only allocations to investors willing to lend their holdings contribute meaningfully to aftermarket

securities lending.

5.2 Primary Market Allocations and Issuance Pricing

The results in Table 6 confirm that allocations to lending investors strengthen the securities lending market in the aftermarket. An active lending market, in turn, reduces the inventory risk borne by underwriters who provide aftermarket liquidity. Nagler and Ottonello (2022) show that underwriter inventory constraints are an important determinant of corporate bond placement and pricing: constrained underwriters face difficulty providing aftermarket liquidity and must resort to parking bonds with relationship investors, with implications for the issuer’s financing costs. Our results suggest a complementary mechanism operating through the securities lending channel. By allocating bonds to investors who make them available for lending, underwriters secure a ready source of lendable supply, easing the inventory constraints they face when providing aftermarket liquidity. With lower expected costs of aftermarket liquidity provision, underwriters need less compensation for their market-making commitment, and this saving can be passed through to the issuer in the form of more favorable issuance terms.

Table 7 tests this prediction. The dependent variables are Underpricing, defined as the index-adjusted first-day return of the bond in the secondary market, and the Offering Yield Spread, defined as the difference between the bond’s offering yield and the yield of a cash-flow-matched synthetic Treasury bond.⁸ Both variables are expressed in basis points, with higher values indicating greater financing costs for the issuer.

All specifications include the same bond and issuer controls as in Equation (4), along with firm and offering month fixed effects. In Column (1), the coefficient on Insurer Lender Allocation is -1.298 ($t = -7.87$): a one-percentage-point increase in the share allocated to lending insurers is associated with a 1.3 basis point reduction in underpricing. The coefficient on Insurer Non-Lender Allocation is also negative at -0.726 ($t = -7.06$), but smaller in magnitude. Column (2) examines the offering yield spread. The coefficient on Insurer Lender Allocation is -0.767 ($t = -3.27$), while Insurer Non-Lender Allocation is -0.423 ($t = -2.79$). Both types of institutional allocation are associated with lower financing costs, but the effect is larger for allocations to lending investors. A

⁸Specifically, we use the yield curve in Liu and Wu (2021) to compute the price of the synthetic bond that completely matches the cash flows of the actual bond, and then invert the synthetic bond price to obtain its yield-to-maturity.

one-standard-deviation increase in Insurer Lender Allocation (3.430 percentage points) is associated with a 4.5 basis point reduction in underpricing, an 11.8% decline relative to the unconditional mean of 37.8 basis points. These results are consistent with the securities lending market providing a form of aftermarket insurance for underwriters: by enabling dealers to source bonds when inventory runs short, an active lending market lowers the effective cost of aftermarket liquidity provision, and this saving is passed through to the issuer in the form of tighter offering spreads and less underpricing.

5.3 Ex-ante Lender Habitats and Issuance Outcomes

The results so far rest on the primary market allocations that insurers actually receive. A natural concern is that the decision to allocate to lending investors is correlated with issuer fundamentals, which could affect aftermarket lending and pricing through channels unrelated to the allocation itself. To address this, we proxy for the realized allocation with an ex-ante measure of the latent demand from lending investors that underwriters can draw on. The premise is that bond investors often concentrate their holdings in segments of the bond market defined by maturity and credit quality, partly due to investment mandates (Bretscher, Schmid, and Ye, 2025; Duong, Shi, and Wang, 2026; Li and Yu, 2026) or regulatory constraints (Ellul, Jotikasthira, and Lundblad, 2011; Becker and Ivashina, 2015; Murray and Nikolova, 2022). A new bond offering falling in a segment heavily held by lending investors (which we term a “lender habitat”) gives underwriters a larger pool of lenders to allocate it to, leading to a potentially more abundant lendable supply for dealers to source from in the aftermarket. We capture the variation in lender habitats through the ex-ante share of lending investors among the holders of the bond’s segment, measured before the new bond offering takes place. Our approach is similar in spirit to other studies that use investors’ holdings to proxy for latent primary bond market demand (Wang and Wu, 2026).

We construct the measure as follows. We partition outstanding corporate bonds along the interaction of four maturity bands (less than 5, 5 to 10, 10 to 15, and 15 or more years to maturity) and seven rating categories (AAA, AA, A, BBB, BB, B, and CCC or below), yielding 28 maturity-by-rating segments. Each new offering i is assigned to the segment $b(i)$ implied by its issue maturity and offering credit rating. In the quarter preceding the offering, we identify all seasoned bonds in a given segment and, separately for insurers and mutual funds, aggregate the book value held by lending and by non-lending investors. Letting $BV_{b,t}^{g,L}$ and $BV_{b,t}^{g,N}$ denote the aggregate book value of bonds in

segment b held in quarter t by lending (L) and non-lending (N) investors of class $g \in \{\text{insurer, fund}\}$, and $\text{Amt}_{b,t}$ the total amount outstanding of those bonds, the lending and non-lending holding shares are $s_{b,t}^{g,L} = \text{BV}_{b,t}^{g,L} / \text{Amt}_{b,t}$ and $s_{b,t}^{g,N} = \text{BV}_{b,t}^{g,N} / \text{Amt}_{b,t}$. For each investor class, the lending tilt of segment b in quarter t is the share of that class's holdings attributable to lending investors:

$$\text{Tilt}_{b,t}^g = \frac{s_{b,t}^{g,L}}{s_{b,t}^{g,L} + s_{b,t}^{g,N}} \times 100. \quad (6)$$

The lender habitat of the segment is the equal-weighted average of the insurer and mutual fund tilts, $\text{Habitat}_{b,t} = \frac{1}{2} (\text{Tilt}_{b,t}^{\text{insurer}} + \text{Tilt}_{b,t}^{\text{fund}})$. Weighting the two classes equally makes the measure invariant to the insurer-versus-fund ownership mix of a segment, so that it reflects the lending propensity of the segment's investor base rather than its composition. We assign each offering i the habitat of its segment $b(i)$ in the quarter preceding the offering. The measure can be intuitively interpreted as the preexisting percentage share of lending investors among the segment's investors, averaged across the insurer and mutual fund classes. For example, a habitat value above (below) 50% indicates that lending investors hold more (less) of the bond's segment than non-lending investors do. Importantly, to rule out within-firm confounding factors, we exclude the issuing firm's own seasoned bonds from every segment, so each habitat is identified purely from the holdings of peer issuers' bonds in the same segment. We retain a segment only when it contains at least five distinct issuers in the quarter.

We first verify that the measure captures the demand it is meant to proxy by relating it to the allocations investors receive. Panel A of Table 8 regresses primary market allocations on the lender habitat, separately for the lender and non-lender allocation of each investor class, with the same bond and issuer controls as in Equation (4) and firm, offering month, and segment fixed effects. For insurers, we use the primary market allocations defined in Section 4. For mutual funds, where primary market allocations are not observed directly, we measure the allocation from the fund's reported holdings of the bond at the delivery quarter-end. We caution that this is not a precise primary market allocation, since it captures the position held at quarter end rather than the initial placement. Nonetheless, it can serve as a proxy for the share of the issue taken up by lending and non-lending mutual funds. The estimates confirm that a bond's lender habitat sorts allocations toward lenders. A one-unit increase in the lender habitat is associated with a 0.047 percentage point higher allocation to lending insurers ($t = 4.18$), while the allocation to non-lending insurers is statistically insignificant

(-0.017 , $t = -0.85$). For mutual funds, lender allocation rises with lender habitat (0.094 , $t = 8.00$) and non-lender allocation falls with it (-0.153 , $t = -8.07$). Thus, bonds that come to market when their segment is populated by lending investors are placed disproportionately with lenders, consistent with the habitat capturing the latent lender demand that underwriters draw on when allocating the issue.

We then re-estimate the aftermarket securities lending and pricing relations of the previous subsections, replacing the realized insurer lender and non-lender allocations with the lender habitat and adding segment fixed effects, so that the habitat is identified from within-segment variation rather than cross-segment differences. Panel B of Table 8 reports the securities lending results. In the interaction specification, both lender habitat and negative inventory are centered at their estimation-sample means, so each main effect is evaluated at the average level of the other variable. In Column (1), aftermarket lendable supply rises with the lender habitat (0.300 , $t = 11.65$): offerings whose segment is held by lending investors generate a larger pool of lendable bonds in the aftermarket. Column (2) reproduces the interaction specification of Equation (5), interacting the habitat with negative dealer inventory. The habitat does not raise the on-loan level directly (-0.007 , $t = -1.38$), but its interaction with negative inventory is positive and significant (0.008 , $t = 2.15$), echoing the findings documented for realized lending insurer allocations: the habitat translates into actual borrowing precisely when dealers face inventory shortfalls. Panel C of Table 8 turns to issuance pricing. A higher lender habitat is associated with lower bond financing costs, reducing both underpricing (-0.616 , $t = -3.12$) and the offering yield spread (-0.814 , $t = -2.86$).

These results are largely consistent with those obtained from realized insurer allocations in Tables 6 and 7. The habitat is an ex-ante measure built only from investors' holdings of other firms, yet it qualitatively supports the realized insurer allocation results. This points to the underwriters' decision to place new bonds with lending investors (given investors' latent demand), rather than firm-level characteristics, as the driving force behind the aftermarket securities lending dynamics and their pass-through to issuance pricing.

A potential concern is that the lender habitat may be correlated with the firm's own issuance supply, rather than only with how underwriters place a given offering. Firms are known to adjust the timing and composition of their bond issuance in response to investor demand and the conditions of the market segments they issue into (Zhu, 2021; Mota and Siani, 2025). If issuers selectively

bring bonds to market in segments populated by lending investors, the habitat-pricing relation could reflect this endogenous supply response.

To address this concern, we test directly whether the predetermined segment habitat forecasts the issuance decision itself. Table A6 reports the results. Panel A, at the segment-by-quarter level, shows that the lagged habitat predicts neither whether a segment receives any new issue (-0.210 , $t = -1.50$) nor the segment's share of aggregate issuance volume in the quarter (-0.007 , $t = -0.32$), conditional on segment size, the number of segment issuers, and segment and quarter fixed effects. Panel B repeats the test at the firm-segment-quarter level over the full set of maturity-by-rating segments each firm could have issued into. The habitat predicts neither whether a firm issues into a segment nor its issuance volume share, whether identified from firm, quarter, and segment fixed effects across all firm-quarters (Columns 1 and 2) or from firm-by-quarter and segment fixed effects within issuing firm-quarters (Columns 3 and 4). Every coefficient is economically negligible and statistically indistinguishable from zero. While existing evidence suggests that firms do respond to aggregate capital supply and segment-level demand, the granular maturity-by-rating lender habitat we exploit does not itself shift the quantity or location of issuance. The pricing and securities lending results are therefore unlikely to stem from issuers steering supply toward lender-rich segments, and are better attributed to the underwriter placement decision conditional on the issue coming to market.

5.4 Securities Lending and Aftermarket Trading Costs

We now turn to the direct relationship between aftermarket securities lending activity and secondary market quality. If dealer-driven bond borrowing facilitates orderly trading in the aftermarket, offerings with greater on-loan quantities should exhibit better liquidity and more efficient intermediation.

Table 9 examines this relationship. The dependent variables, each averaged over the first 20 trading days, are: Customer Buy Cost (%) and Customer Sell Cost (%), signed transaction costs computed for each customer trade as $\ln(P^{\text{trade}}/P^{\text{benchmark}}) \times (-1) \times \text{trade_side}$, where $P^{\text{benchmark}}$ is the most recent interdealer trade price preceding the customer trade, within five calendar days; and Amihud illiquidity, defined as the absolute daily percentage-point return per million dollars of trading volume. We compute the customer transaction costs separately for purchases and sales following O'Hara and Zhou (2021). The key independent variable is Aftermarket On Loan

(%), the average daily on-loan quantity over the 20-day aftermarket window. All specifications include the same bond and issuer controls as in Equation (4), along with firm and month fixed effects.

The customer transaction cost results reveal an asymmetry between the buy and sell sides. In the Customer Buy Cost regression, the coefficient on Aftermarket On Loan is positive at 0.005 ($t = 2.68$), while in the Customer Sell Cost regression it is negative and statistically significant (-0.006 , $t = -3.81$). The positive buy-side coefficient is consistent with dealers charging more to fill customer purchases: meeting buy orders often requires dealers to borrow the bond, and the associated loan fees are passed through to buyers in the form of wider spreads. The negative sell-side coefficient reflects the opposite incentive. Customer sells supply bonds that dealers value, since acquiring them helps cover short positions or return borrowed securities, so dealers compensate sellers for this liquidity by quoting tighter spreads. In short, securities lending raises the cost of buying, where dealers must source the bond, and lowers the cost of selling, where customer flow resolves dealer inventory imbalances.

We document that overall bond liquidity improves with lending activity. The Amihud illiquidity measure declines significantly with on-loan quantity, with a coefficient of -0.047 ($t = -2.86$). A one-standard-deviation increase in on-loan quantity corresponds to a 0.074 unit reduction in Amihud illiquidity, approximately 8.6% of the sample mean (0.855), indicating that greater securities lending activity is associated with a materially lower price impact of trading in the aftermarket.

5.5 Securities Lending and Aftermarket Price Formation

Finally, we examine whether securities lending supports healthy price formation in the aftermarket. New corporate bond issues are typically underpriced in the primary market, and the aftermarket is the venue where prices converge toward fundamental value (Cai, Helwege, and Warga, 2007). If securities lending facilitates this convergence by enabling dealers to intermediate trades and maintain liquid markets, we should observe a positive association between on-loan quantities and aftermarket price formation.

Table 10 presents the results. The dependent variables are the cumulative return from issuance through the end of the 20-day aftermarket window, measured using either the actual TRACE transaction prices or indicative price quotes obtained from S&P Capital IQ Pro. All specifications include the same bond and issuer controls as in Equation (4), along with firm and month fixed effects.

The coefficient on Aftermarket On Loan is 0.056 ($t = 2.77$) for the TRACE-based return and 0.045 ($t = 2.47$) for the quote-based measure. A one-standard-deviation increase in on-loan quantity (1.568 percentage points) corresponds to approximately 8.8 and 7.1 basis points of additional price appreciation, respectively. These magnitudes are economically meaningful relative to the unconditional mean TRACE-based return of 38.1 basis points over the 20-day window, indicating that securities lending activity is associated with a meaningful acceleration of post-issuance price convergence.

These results complete the empirical narrative. Underwriters allocate newly issued bonds to investors who participate in securities lending, over and above the information production and relationship motives documented in the bookbuilding literature, and particularly when primary market demand is strong. These allocations sustain an active securities lending market in the aftermarket, which is associated with lower issuance costs, greater market liquidity, and healthier price formation. The evidence indicates that liquidity-driven bond lending is not merely a byproduct of aftermarket trading but a mechanism that underwriters cultivate through their primary market allocation decisions, with tangible benefits for issuers and secondary market functioning.

6 Conclusion

This paper studies how underwriters' role as secondary market dealers shapes their primary market allocations in corporate bond offerings, and the role of securities lending in connecting the two markets. Using daily bond-level securities lending data matched with transaction records and dealer-level inventory positions from the academic version of TRACE, we show that borrowing demand for newly issued bonds rises sharply once the bonds are delivered to investors and remains elevated throughout the issuance aftermarket. This demand reflects dealer liquidity provision rather than speculation. Dealers who fill customer purchase orders with limited inventory on hand accumulate negative inventory positions and cover them by borrowing from the securities lending market.

We trace this mechanism upstream to the primary market. Underwriters, who are often the same dealers that provide aftermarket liquidity, preferentially allocate bonds to investors who participate in securities lending, and this advantage is amplified when strong bookbuilding demand signals that dealers will lack the inventory to fill customer purchase orders once secondary market trading begins.

These allocation patterns carry tangible consequences: offerings with larger lender allocations exhibit greater aftermarket lendable supply, more active lending precisely when dealer borrowing needs are highest, and more favorable issuance pricing. The resulting lending activity is, in turn, associated with better secondary market quality, including lower price impact and more orderly aftermarket price formation.

Our findings carry implications for market design and regulation. The associations we document suggest that policies encouraging securities lending participation by institutional investors could support aftermarket liquidity for newly issued bonds and lower issuance costs, although evaluating the causal effects of such policies requires further evidence. The results also suggest that primary market allocation in corporate bond offerings serves a market-making function beyond the traditional roles of information production and relationship building ([Nikolova, Wang, and Wu, 2020](#)): underwriters use allocations to secure a reliable supply of bonds they can borrow when intermediating trades in the secondary market. Our findings show that the primary bond market and the securities lending market are more closely linked than previously recognized, and understanding how these two markets interact remains an important direction for future work.

References

- An, Y. 2022. Competing with Inventory in Dealership Markets .
- Asquith, P., A. S. Au, T. Covert, and P. A. Pathak. 2013. The market for borrowing corporate bonds. *Journal of Financial Economics* 107:155–82.
- Barardehi, Y., Z. Da, P. Dixon, and J. L. Wang. 2025. You can Only Lend What you Own: Inferring Daily Institutional Trading from Security Lending Supply .
- Becker, B., and V. Ivashina. 2015. Reaching for Yield in the Bond Market. *Journal of Finance* 70:1863–902.
- Benveniste, L. M., and P. A. Spindt. 1989. How investment bankers determine the offer price and allocation of new issues. *Journal of Financial Economics* 24:343–61.
- Bessembinder, H., S. Jacobsen, W. Maxwell, and K. Venkataraman. 2022. Overallocation and secondary market outcomes in corporate bond offerings. *Journal of Financial Economics* 146:444–74.
- Bessembinder, H., C. Spatt, and K. Venkataraman. 2020. A Survey of the Microstructure of Fixed-Income Markets. *Journal of Financial and Quantitative Analysis* 55:1–45.
- Bretscher, L., L. Schmid, and T. Ye. 2025. Passive Demand and Active Supply: Evidence from Maturity-mandated Corporate Bond Funds .
- Cai, N. K., J. Helwege, and A. Warga. 2007. Underpricing in the Corporate Bond Market. *Review of Financial Studies* 20:2021–46.
- Chen, S., A. Tran, and P. Wang. 2026. Lending at a Cost: Liquidity Fragility in Bond Mutual Funds .
- Cornelli, F., and D. Goldreich. 2001. Bookbuilding and Strategic Allocation. *Journal of Finance* 56:2337–69.
- Dick-Nielsen, J. 2014. How to Clean Enhanced TRACE Data .
- Dick-Nielsen, J., and T. K. Poulsen. 2019. How to Clean Academic TRACE Data .
- Dong, X., and Q. Zhu. 2024. Equity lender base and limits to arbitrage: Position-level evidence from mutual funds .
- Duong, H. N., A. Gorbenko, P. S. Kalev, and X. Tian. 2025. Short Interest in Bonds and Aggregate Stock Returns .
- Duong, H. N., Y. Shi, and G. B. Wang. 2026. Bondholder Fragility Risk and Corporate Liquidity Policy .
- Ellul, A., C. Jotikasthira, and C. T. Lundblad. 2011. Regulatory pressure and fire sales in the corporate bond market. *Journal of Financial Economics* 101:596–620.
- Fang, C. 2025. Monetary Policy Amplification through Bond Fund Flows .
- Goldstein, M. A., P. Irvine, and A. Puckett. 2011. Purchasing IPOs with Commissions. *Journal of Financial and Quantitative Analysis* 46:1193–225.
- Goyal, A., Y. Nozawa, and Y. Qiu. 2026. On The Drivers of Corporate Bond Lending .
- Hanley, K. W. 1993. The underpricing of initial public offerings and the partial adjustment phenomenon. *Journal of Financial Economics* 34:231–50.
- Hendershott, T., R. Kozhan, and V. Raman. 2020. Short Selling and Price Discovery in Corporate Bonds. *Journal of Financial and Quantitative Analysis* 55:77–115.
- Honkanen, P. 2025. Securities Lending and Trading by Active and Passive Funds. *Journal of Financial and Quantitative Analysis* 60:1272–309.
- Hotchkiss, E. S., L. Wang, and Y. E. Zhao. 2026. Demand Elasticity in the Primary Market for Corporate Bonds .

- Jenkinson, T., H. Jones, and F. Suntheim. 2018. Quid Pro Quo? What Factors Influence IPO Allocations to Investors? *Journal of Finance* 73:2303–41.
- Li, J., and H. Yu. 2026. Investor Composition and the Liquidity Component in the U.S. Corporate Bond Market. *Journal of Finance* 81:871–922.
- Li, T., and Q. Zhu. 2025. (Re)call of Duty: Mutual Fund Securities Lending and Proxy Voting .
- Liu, Y., and J. C. Wu. 2021. Reconstructing the yield curve. *Journal of Financial Economics* 142:1395–425.
- Loughran, T., and J. R. Ritter. 2002. Why Don't Issuers Get Upset about Leaving Money on the Table in IPOs? *Review of Financial Studies* 15:413–43.
- Macchiavelli, M., and X. A. Zhou. 2022. Funding Liquidity and Market Liquidity: The Broker-Dealer Perspective. *Management Science* 68:3379–98.
- Mota, L., and K. Siani. 2025. Financially Sophisticated Firms .
- Murray, S., and S. Nikolova. 2022. The Bond-Pricing Implications of Rating-Based Capital Requirements. *Journal of Financial and Quantitative Analysis* 57:2177–207.
- Nagler, F., and G. Ottonello. 2022. Inventory-Constrained Underwriters and Corporate Bond Offerings. *Review of Asset Pricing Studies* 12:639–66.
- Nikolova, S., and L. Wang. 2026. Corporate Bond Flipping. *Journal of Financial Economics* forthcoming.
- Nikolova, S., L. Wang, and J. J. Wu. 2020. Institutional allocations in the primary market for corporate bonds. *Journal of Financial Economics* 137:470–90.
- Nimalendran, M., J. R. Ritter, and D. Zhang. 2007. Do today's trades affect tomorrow's IPO allocations? *Journal of Financial Economics* 84:87–109.
- O'Hara, M., and X. A. Zhou. 2021. Anatomy of a liquidity crisis: Corporate bonds in the COVID-19 crisis. *Journal of Financial Economics* 142:46–68.
- Reuter, J. 2006. Are IPO Allocations for Sale? Evidence from Mutual Funds. *Journal of Finance* 61:2289–324.
- Siani, K. 2026. Raising Bond Capital in Segmented Markets. *Review of Financial Studies* forthcoming.
- Wang, G. B. 2026. Non-pecuniary Securities Lending by Passive Funds .
- Wang, L. 2021. Lifting the veil: The price formation of corporate bond offerings. *Journal of Financial Economics* 142:1340–58.
- Wang, L., and J. J. Wu. 2026. Deciphering Greenium: The Role of Investor Demand. *Management Science* mns.2024.05106.
- Zhu, Q. 2021. Capital supply and corporate bond issuances: Evidence from mutual fund flows. *Journal of Financial Economics* 141:551–72.

Figures

Figure 1: **Trading Activity of New Bond Issues**

This figure plots the dynamics of secondary market trading volume as well as the number of requests for quotes against the age of the bond. The observations are at the bond-month level. We keep all monthly observations during the first 24 months since issuance. For each event month, we plot separately the average total customer trading volume scaled by the issue's amount outstanding as well as the total number of requests for quotes dealers receive across all bond issues in the sample, along with 95% confidence intervals. Customer trading volume data come from TRACE, while request-for-quote data come from S&P Capital IQ Pro.

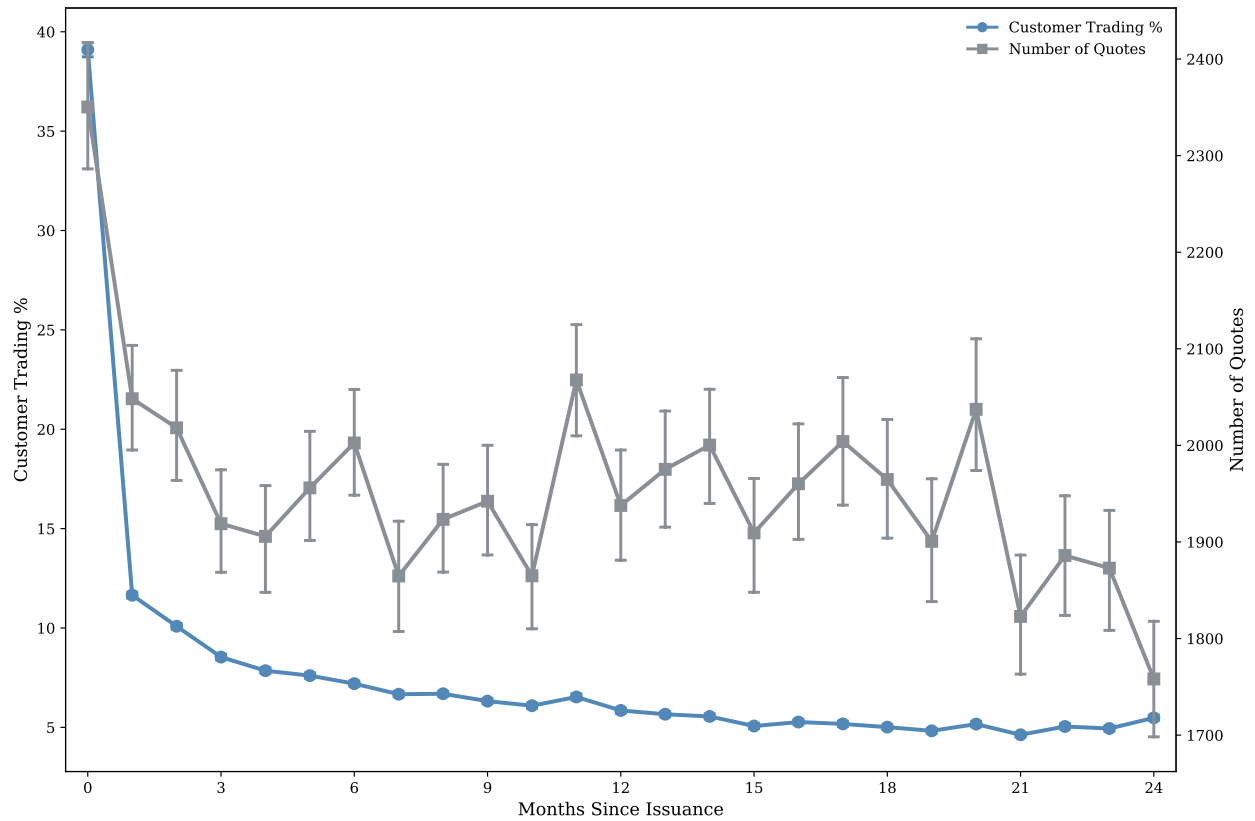


Figure 2: Securities Lending Demand of New Bond Offerings

This figure plots the dynamics of raw and issuer-adjusted bond loan demand in the first 20 trading days following issuance settlement. Issuer-adjusted loan demand is calculated by subtracting the daily average loan demand of same-firm peer bonds from the raw loan demand of the newly issued bond. Event day is defined as the number of trading days since the issuance settlement date. For each event day, we plot the average bond on-loan quantity scaled by amount outstanding across all bond issues in the sample, along with 95% confidence intervals.

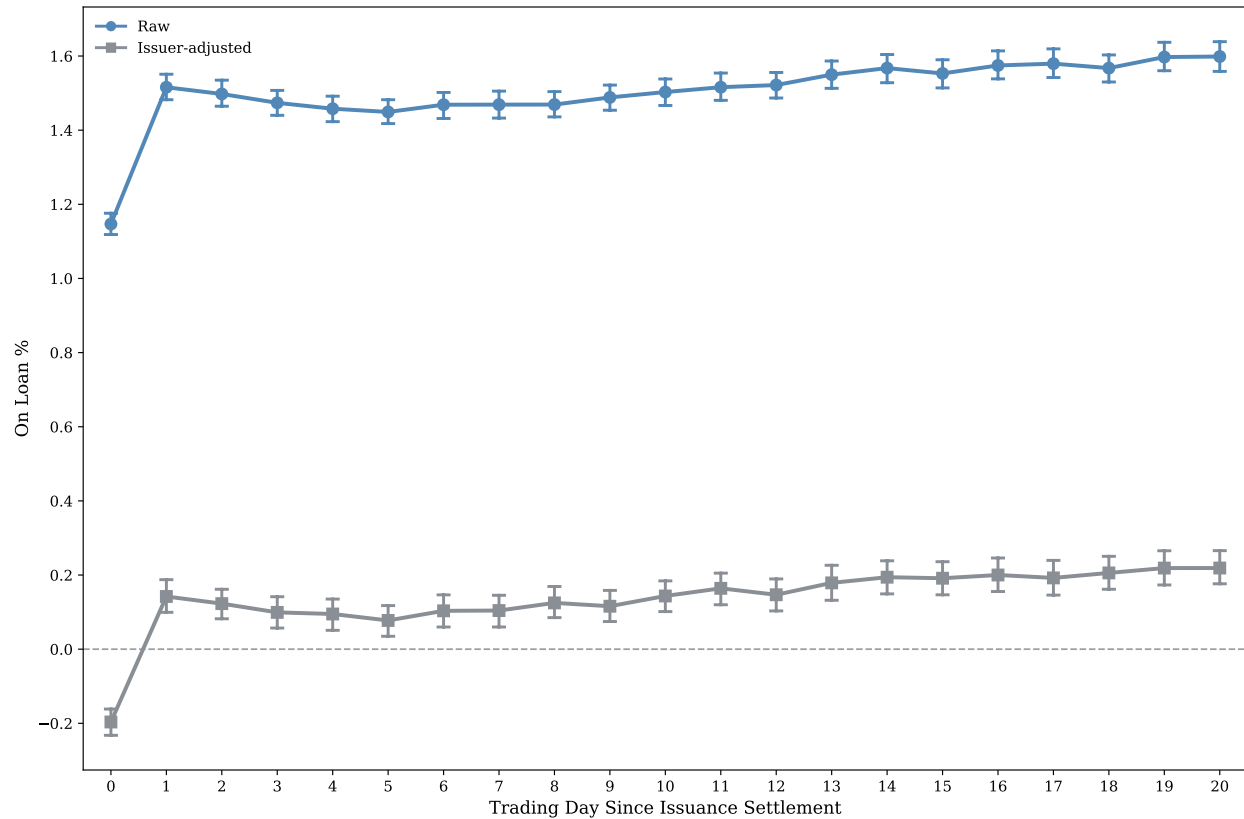


Figure 3: Dealer Negative Inventory of New Bond Offerings

This figure plots the dynamics of raw and issuer-adjusted dealer negative inventory on the newly issued bond in the first 20 trading days following issuance settlement. Issuer-adjusted negative inventory is calculated by subtracting the daily average negative inventory of same-firm peer bonds from the raw negative inventory of the newly issued bond. Event day is defined as the number of trading days since the issuance settlement date. For each event day, we plot the average dealer negative inventory scaled by amount outstanding across all bond issues in the sample, along with 95% confidence intervals.

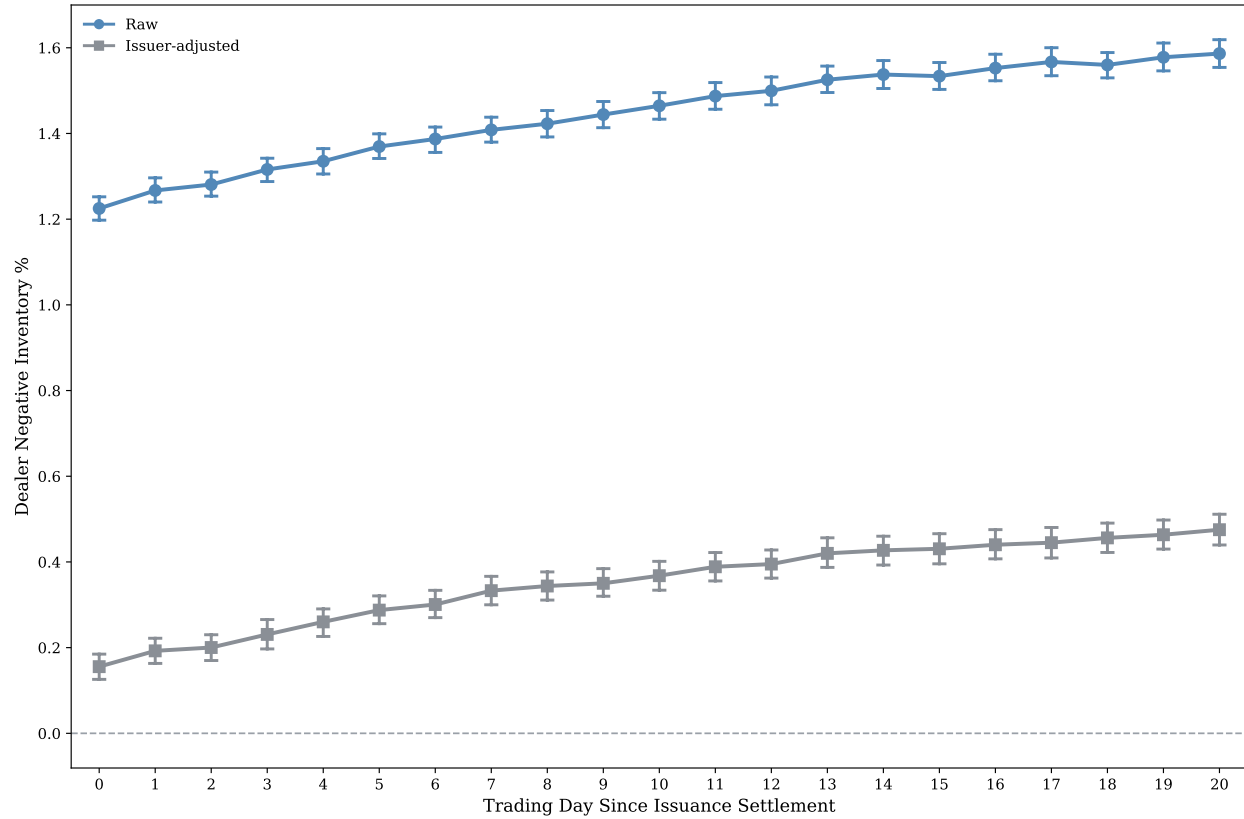
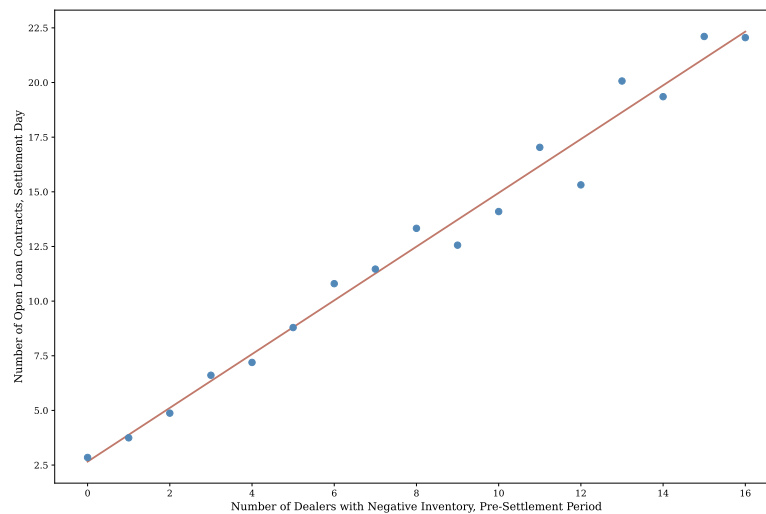


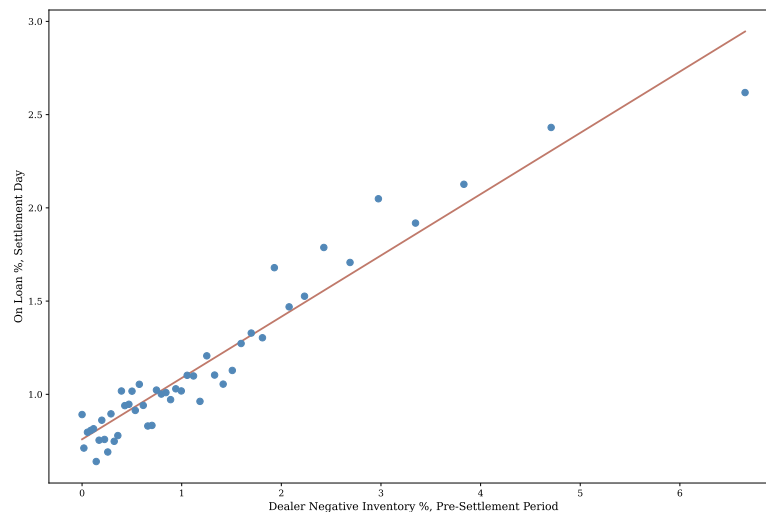
Figure 4: **Pre-Settlement Negative Inventory and Settlement Day Securities Lending Demand**

This figure presents binned scatter plots and fitted linear trends relating aggregate dealer negative inventory accumulated during the pre-settlement trading period to bond securities lending demand on the settlement day for new bond offerings. Settlement is the first date on which physical delivery occurs and securities lending becomes possible. Panel A plots the extensive margin, relating the number of dealers holding negative inventory during the pre-settlement period to the number of open loan contracts on the settlement day. Panel B plots the intensive margin, relating dealer negative inventory (as a percentage of the issue size) during the pre-settlement period to on-loan quantity (as a percentage of the issue size) on the settlement day.

Panel A: Extensive Margin



Panel B: Intensive Margin



Tables

Table 1: **Summary Statistics**

This table reports the summary statistics of the key variables in the paper.

Panel A: Bond-day Level

	N	Mean	Std	P25	Median	P75
On Loan %	177,206	1.514	1.841	0.297	0.886	2.029
Δ On Loan %	177,206	0.023	0.486	-0.068	0.000	0.072
NegInv %	177,206	1.503	2.028	0.445	1.003	1.960
Δ NegInv %	177,206	0.019	0.327	-0.019	0.000	0.046
Lendable Supply %	177,206	18.754	7.649	13.622	18.542	23.721
Loan Fee %	177,206	0.375	0.261	0.269	0.375	0.375
Return %	177,206	0.022	0.445	-0.141	0.000	0.193
Turnover %	177,206	1.794	2.241	0.300	0.991	2.382

Panel B: Insurer Allocation Level

	N	Mean	Std	P25	Median	P75
1[Allocation] $\times$ 100	11,311,942	2.437	15.421	0.000	0.000	0.000
1[Flip 2d] $\times$ 100	275,723	7.421	26.211	0.000	0.000	0.000
1[Flip 20d] $\times$ 100	275,723	11.320	31.683	0.000	0.000	0.000
1[Lending Insurer]	11,311,942	0.112	0.316	0.000	0.000	0.000
Information Production	11,311,942	4.472	5.253	0.000	2.833	6.653
Dealer Relationship	11,311,942	0.091	0.234	0.003	0.013	0.057
Firm Holding Share	11,311,942	0.155	0.489	0.000	0.000	0.000
log(Assets)	11,311,942	6.362	2.154	4.784	6.084	7.738
Flow %	11,311,942	0.823	3.744	-0.199	0.715	1.914

Table 1: **Summary Statistics** (continued)

Panel C: Mutual Fund Allocation Level

	N	Mean	Std	P25	Median	P75
1[Allocation] $\times$ 100	9,984,628	4.204	20.068	0.000	0.000	0.000
1[Lending MF]	9,984,628	0.272	0.445	0.000	0.000	1.000
Information Production	9,984,628	3.258	5.164	0.000	0.786	4.731
Dealer Relationship	9,984,628	0.135	0.421	0.001	0.007	0.041
Firm Holding Share	9,984,628	0.089	0.359	0.000	0.000	0.000
log(Assets)	9,984,628	6.216	1.862	4.924	6.276	7.478
Flow %	9,984,628	2.394	15.795	-3.609	0.146	4.841

Panel D: Issuance Level

	N	Mean	Std	P25	Median	P75
Insurer Lender Allocation %	8,085	3.309	3.430	0.700	2.264	4.842
Insurer Non-Lender Allocation %	8,085	7.718	6.742	2.839	5.766	10.520
MF Lender Allocation %	8,085	3.725	3.054	1.390	3.047	5.354
MF Non-Lender Allocation %	8,085	10.525	7.045	5.065	8.987	15.063
Aftermarket Lendable Supply %	8,085	18.636	7.153	13.719	18.398	23.350
Aftermarket On Loan %	8,085	1.468	1.568	0.427	0.948	1.904
Negative Inventory %	8,085	1.465	1.376	0.543	1.058	1.917
Underpricing	8,066	37.833	55.649	6.383	19.166	48.840
Offering Yield Spread	8,079	202.319	159.090	89.278	145.150	279.316
Customer Buy Cost %	7,842	0.201	0.230	0.060	0.145	0.299
Customer Sell Cost %	7,791	0.151	0.187	0.051	0.124	0.227
Amihud	8,043	0.855	2.275	0.049	0.152	0.565
TRACE Return %	8,085	0.381	2.358	-0.449	0.211	1.128
Quote Return %	8,085	0.227	1.997	-0.182	0.000	0.602
Lender Habitat	7,989	31.011	4.768	28.217	31.581	34.078
log(Issue Size)	8,085	6.548	0.578	6.215	6.551	6.908
log(Maturity)	8,085	1.965	0.499	1.614	2.085	2.305
Issue Rating	8,085	8.813	3.203	7.000	9.000	10.000
1[Rule 144A]	8,085	0.308	0.462	0.000	0.000	1.000
1[Rule 415]	8,085	0.429	0.495	0.000	0.000	1.000
MF Ownership %	8,085	12.726	6.631	7.755	10.847	16.629
Insurer Ownership %	8,085	22.162	13.609	10.985	20.486	31.489
log(Market Equity)	8,085	10.049	1.494	9.070	10.150	11.134
Book-to-Market	8,085	0.658	0.579	0.258	0.506	0.877
Leverage	8,085	0.329	0.168	0.203	0.318	0.438

Table 2: Dealer Negative Inventory and Securities Lending

This table presents the regression estimates of bond loan quantity on measures of dealer negative inventory, in both first-difference and level specifications. The observations are at the bond-day level. The sample covers the first 20 trading days following bond issuance settlement. t-statistics are reported in parentheses. Standard errors are clustered at the bond and date level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) $\Delta N(\text{Loan})$ (t+1)	(2) $N(\text{Loan})$ (t+1)	(3) $\Delta \text{On Loan}$ % (t+1)	(4) $\text{On Loan \%}$ (t+1)
$\Delta N(\text{NegInv Dealer})$ (t+1)	0.935*** (45.27)			
$\Delta N(\text{PosInv Dealer})$ (t+1)	-0.243*** (-13.61)			
$N(\text{NegInv Dealer})$		1.046*** (25.17)		
$N(\text{PosInv Dealer})$		-0.255*** (-8.46)		
$\Delta \text{NegInv \%}$ (t+1)			0.479*** (65.42)	
$\Delta \text{PosInv \%}$ (t+1)			-0.031*** (-14.24)	
$\text{NegInv \%}$				0.190*** (15.02)
$\text{PosInv \%}$				-0.033*** (-6.29)
$\text{On Loan \%}$	-1.361*** (-26.13)	4.971*** (15.31)	-0.202*** (-31.69)	0.606*** (41.75)
$\text{Lendable Supply \%}$	-0.181*** (-17.72)	-0.069*** (-3.90)	-0.011*** (-11.21)	-0.013*** (-9.02)
$\text{Loan Fee \%}$	-0.213 (-1.52)	1.122** (1.98)	-0.005 (-0.28)	0.017 (0.61)
$\text{Return \%}$	0.244*** (7.28)	0.251*** (5.14)	0.027*** (8.31)	0.011*** (3.06)
$\text{Turnover \%}$	-0.009 (-1.18)	0.004 (0.37)	-0.000 (-0.24)	0.004*** (4.22)
Bond Offering FE	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes
Adjusted R ²	0.100	0.892	0.264	0.927
N	177,206	177,206	177,206	177,206

Table 3: **Primary Market Allocation to Lending Insurers**

This table presents the regression estimates of primary market allocation decisions. The observations are at the insurer-bond level. The sample includes all insurers with allocation potential, defined as having received a primary market allocation from any of the offering's lead underwriters during the four quarters preceding the offering. t-statistics are reported in parentheses. Standard errors are clustered at the bond and offering quarter level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) 1[Allocation] × 100	(2) 1[Allocation] × 100	(3) 1[Allocation] × 100
1[Lending Insurer]	0.541*** (6.97)	0.622*** (8.82)	
1[Lending Insurer] × 1[High Bookbuilding Demand]		0.264** (2.41)	0.246** (2.32)
Information Production	0.055*** (20.93)	0.055*** (19.60)	0.059*** (22.26)
Dealer Relationship	9.236*** (33.39)	9.580*** (26.87)	0.715*** (5.47)
Firm Holding Share	0.530*** (14.35)	0.502*** (11.16)	0.490*** (12.49)
log(Assets)	0.332*** (35.46)	0.317*** (28.79)	
Flow %	0.032*** (8.99)	0.032*** (7.31)	
Bond Offering FE	Yes	Yes	Yes
Insurer × Quarter FE	No	No	Yes
Adjusted R ²	0.041	0.040	0.097
N	11,311,941	7,481,609	7,481,378

Table 4: Primary Market Allocation to Lending Mutual Funds

This table presents regression estimates of bond offering allocations to mutual funds based on delivery-quarter-end holdings. The observations are at the mutual fund-bond level. The sample includes all mutual funds with allocation potential, defined as having reported principal trading volume with any of the offering's lead underwriters in regulatory filings covering the four quarters preceding the offering. The columns labeled Quarter-end restrict the sample to offerings that settle within one trading day of the quarter-end. t-statistics are reported in parentheses. Standard errors are clustered at the bond and offering quarter level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) 1[Allocation] × 100	(2) 1[Allocation] × 100	(3) 1[Allocation] × 100	(4) 1[Allocation] × 100
1[Lending MF]	1.117*** (13.97)		1.295*** (5.79)	
1[Lending MF] × 1[High Bookbuilding Demand]		0.388*** (4.38)		0.896** (2.63)
Sample	All	All	Quarter-end	Quarter-end
Controls	Yes	Yes	Yes	Yes
Bond Offering FE	Yes	Yes	Yes	Yes
Fund × Quarter FE	No	Yes	No	Yes
Adjusted R ²	0.062	0.140	0.058	0.192
N	9,915,676	6,383,296	191,081	120,042

Table 5: Securities Lending of New Bond Offerings: Mutual Fund Position-Level Evidence

This table presents position-level evidence on the securities lending of newly issued bonds using mutual fund N-PORT filings. The dependent variable is an indicator equal to one if the fund reports the position as on loan, scaled by 100. The key explanatory variable in Column (1) is an indicator for whether the position is a newly issued bond; Column (2) splits new issues into those with high and low bookbuilding demand. The observations are at the fund-bond-quarter position level. t-statistics are reported in parentheses. Standard errors are clustered at the bond and fund level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) 1[Loaned] $\times$ 100	(2) 1[Loaned] $\times$ 100
1[New Issue]	0.342** (2.18)	
1[New Issue & High Bookbuilding Demand]		0.707** (2.29)
1[New Issue & Low Bookbuilding Demand]		0.265* (1.70)
Bond Size	-1.270*** (-4.67)	-1.273*** (-4.69)
Time to Maturity	-0.037*** (-2.98)	-0.037*** (-2.99)
Rating	0.393*** (4.13)	0.391*** (4.15)
1[Rule 144A]	-1.847*** (-3.95)	-1.862*** (-3.99)
1[Rule 415]	0.501** (2.24)	0.496** (2.22)
Fund $\times$ Quarter FE	Yes	Yes
Firm $\times$ Quarter FE	Yes	Yes
Adjusted R ²	0.189	0.189
N	835,870	835,870

Table 6: Primary Market Insurer Allocation and Aftermarket Securities Lending

This table presents the regression estimates of aftermarket securities lending outcomes on primary market allocations to lending and non-lending insurers. The dependent variables are aftermarket lendable supply (Column 1) and on-loan quantity (Column 2). Column 2 additionally interacts the insurer allocation measures with aftermarket dealer negative inventory. The observations are at the bond issuance level. t-statistics are reported in parentheses. Standard errors are clustered at the bond level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Aftermarket Lendable Supply %	(2) Aftermarket On Loan %
Insurer Lender Allocation %	0.463*** (16.36)	0.014*** (2.73)
Insurer Non-Lender Allocation %	-0.025 (-1.54)	-0.004 (-1.53)
Insurer Lender Allocation % $\times$ Negative Inventory %		0.016*** (2.86)
Insurer Non-Lender Allocation % $\times$ Negative Inventory %		-0.004 (-1.41)
Negative Inventory %		0.686*** (36.65)
Controls	Yes	Yes
Firm FE	Yes	Yes
Month FE	Yes	Yes
Adjusted R ²	0.430	0.517
N	8,058	8,058

Table 7: Primary Market Insurer Allocation and Issuance Pricing

This table presents the regression estimates of issuance pricing on primary market allocations to lending and non-lending insurers. The dependent variables are underpricing and the offering yield spread, both expressed in basis points. The observations are at the bond issuance level. t-statistics are reported in parentheses. Standard errors are clustered at the bond level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Underpricing (bps)	(2) Offering Yield Spread (bps)
Insurer Lender Allocation %	-1.298*** (-7.87)	-0.767*** (-3.27)
Insurer Non-Lender Allocation %	-0.726*** (-7.06)	-0.423*** (-2.79)
Controls	Yes	Yes
Firm FE	Yes	Yes
Month FE	Yes	Yes
Adjusted R ²	0.416	0.860
N	8,058	8,058

Table 8: Lender Habitat: Allocation, Securities Lending, and Issuance Pricing

This table examines ex-ante lender habitat and three sets of outcomes. Panel A relates habitat to insurer and mutual fund lender and non-lender allocations; mutual fund allocations use delivery-quarter-end holdings. Panel B relates habitat to aftermarket lendable supply (Column 1) and on-loan quantity (Column 2); Column 2 interacts mean-centered habitat with mean-centered dealer negative inventory. Panel C relates habitat to underpricing (Column 1) and the offering yield spread (Column 2), both in basis points. The observations are bond issuances. t-statistics are reported in parentheses. Standard errors are clustered at the bond level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Primary Market Allocation

	(1) Insurer Lender Allocation %	(2) Insurer Non-Lender Allocation %	(3) MF Lender Allocation %	(4) MF Non-Lender Allocation %
Lender Habitat	0.047*** (4.18)	-0.017 (-0.85)	0.094*** (8.00)	-0.153*** (-8.07)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Segment FE	Yes	Yes	Yes	Yes
Adjusted R ²	0.452	0.592	0.372	0.617
N	7,961	7,961	7,961	7,961

Table 8: **Lender Habitat: Allocation, Securities Lending, and Issuance Pricing** (continued)
t-statistics are reported in parentheses. Standard errors are clustered at the bond level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Aftermarket Securities Lending

	(1) Aftermarket Lendable Supply %	(2) Aftermarket On Loan %
Lender Habitat	0.300*** (11.65)	-0.007 (-1.38)
Lender Habitat $\times$ Negative Inventory %		0.008** (2.15)
Negative Inventory %		0.683*** (37.05)
Controls	Yes	Yes
Firm FE	Yes	Yes
Month FE	Yes	Yes
Segment FE	Yes	Yes
Adjusted R ²	0.425	0.523
N	7,961	7,961

Panel C: Issuance Pricing

	(1) Underpricing (bps)	(2) Offering Yield Spread (bps)
Lender Habitat	-0.616*** (-3.12)	-0.814*** (-2.86)
Controls	Yes	Yes
Firm FE	Yes	Yes
Month FE	Yes	Yes
Segment FE	Yes	Yes
Adjusted R ²	0.417	0.870
N	7,961	7,961

Table 9: Securities Lending Demand and Aftermarket Trading Costs

This table presents the regression estimates of aftermarket trading costs on aftermarket bond loan quantity. The dependent variables are customer buy cost, customer sell cost, and the Amihud illiquidity measure. The observations are at the bond issuance level. t-statistics are reported in parentheses. Standard errors are clustered at the bond level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Customer Buy Cost %	(2) Customer Sell Cost %	(3) Amihud
Aftermarket On Loan %	0.005*** (2.68)	-0.006*** (-3.81)	-0.047*** (-2.86)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Adjusted R ²	0.343	0.235	0.173
N	7,684	7,684	7,684

Table 10: Securities Lending Demand and Aftermarket Price Formation

This table presents the regression estimates of aftermarket price formation on aftermarket bond loan quantity. The dependent variables are aftermarket cumulative returns based on TRACE transaction prices and dealer quotes, both expressed in percentage points. The observations are at the bond issuance level. t-statistics are reported in parentheses. Standard errors are clustered at the bond level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) TRACE Return %	(2) Quote Return %
Aftermarket On Loan %	0.056*** (2.77)	0.045** (2.47)
Controls	Yes	Yes
Firm FE	Yes	Yes
Month FE	Yes	Yes
Adjusted R ²	0.379	0.314
N	7,684	7,684

Appendix

A Additional figures and tables

Figure A1: **Long-Run Securities Lending Demand and Dealer Negative Inventory**

This figure plots the evolution of bond loan demand and aggregate dealer negative inventory over the first 24 months following issuance settlement. Event month is defined as the number of months since the issuance settlement date. On-loan quantity, shown on the left axis, and aggregate dealer negative inventory, shown on the right axis, are expressed as percentages of amount outstanding. For each event month, we plot the average across all bond issues in the sample, along with 95% confidence intervals.

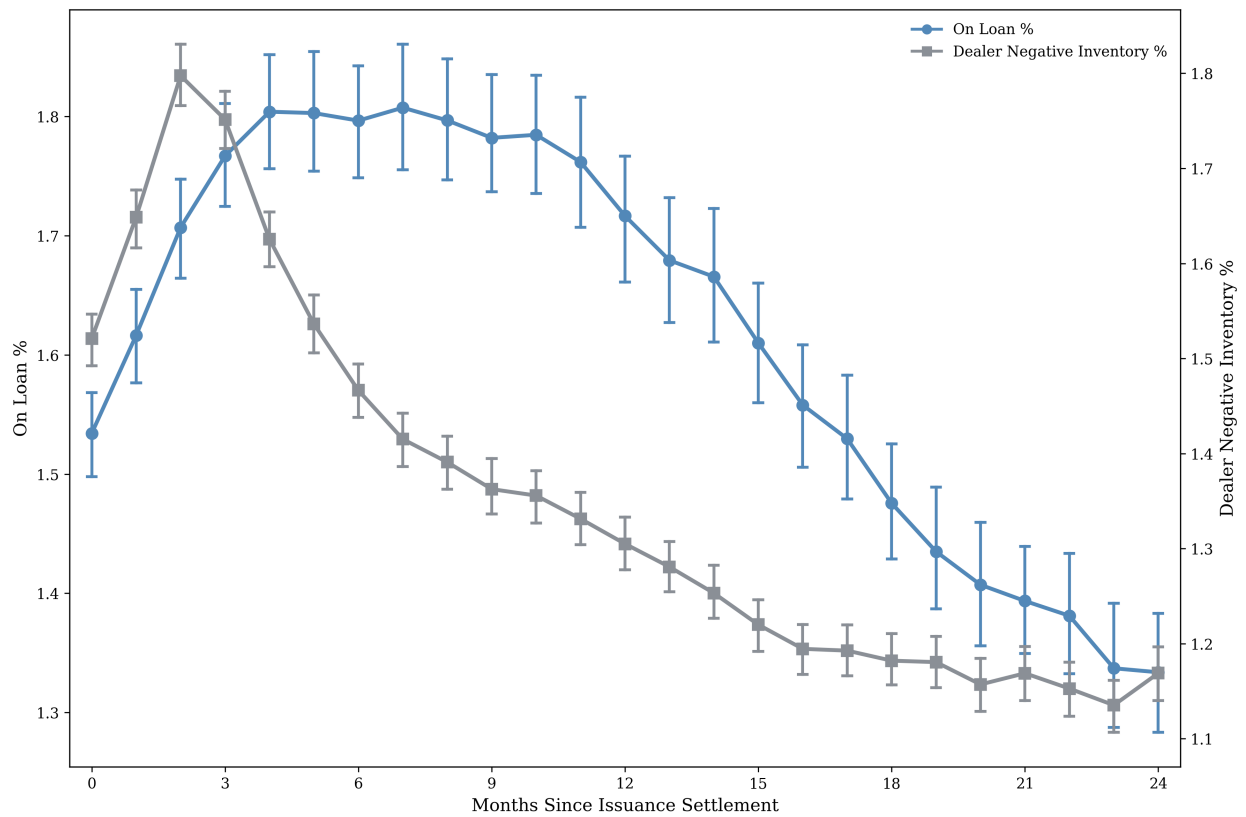


Figure A2: Lendable Supply of New Bond Offerings

This figure plots the evolution of raw and issuer-adjusted bond lendable supply in the first 20 trading days following issuance settlement. Issuer-adjusted lendable supply is calculated by subtracting the daily average lendable supply of same-firm peer bonds from the raw lendable supply of the newly issued bond. Event day is defined as the number of trading days since the issuance settlement date. For each event day, we plot the average bond lendable supply scaled by amount outstanding across all bond issues in the sample, along with 95% confidence intervals.

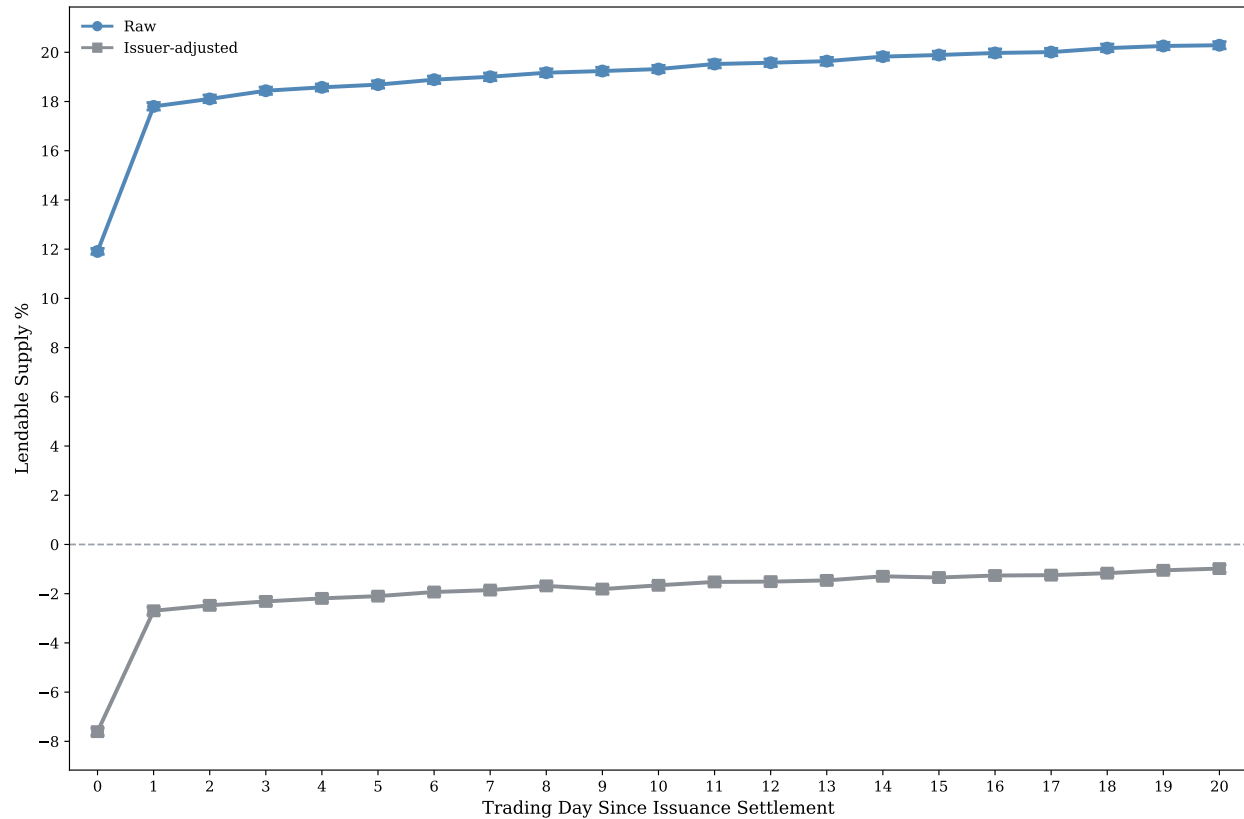


Figure A3: Loan Fee of New Bond Offerings

This figure plots the evolution of raw and issuer-adjusted bond loan fees in the first 20 trading days following issuance settlement. Issuer-adjusted loan fees are calculated by subtracting the daily average loan fees of same-firm peer bonds from the raw loan fees of the newly issued bond. Event day is defined as the number of trading days since the issuance settlement date. For each event day, we plot the average bond loan fee across all bond issues in the sample, along with 95% confidence intervals.

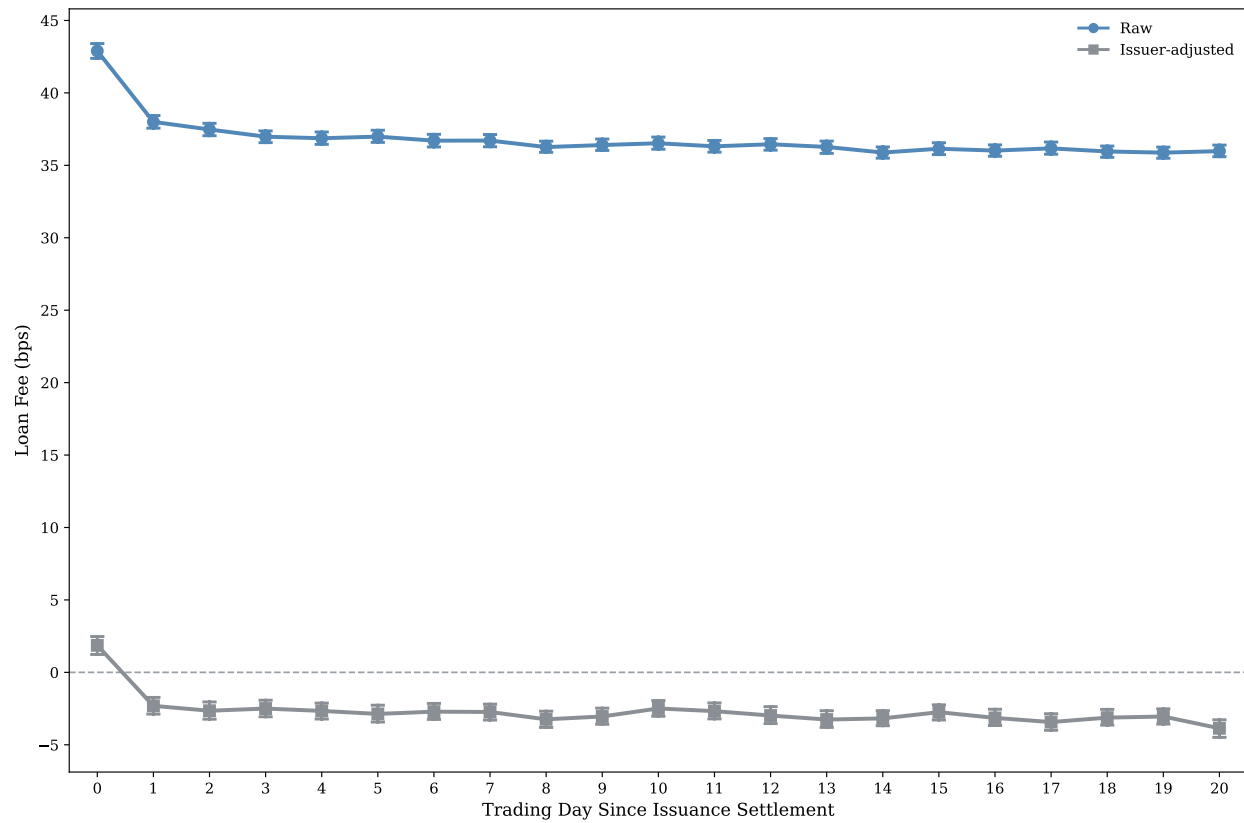


Figure A4: Cumulative Customer Order Flow Imbalance in the Issuance Aftermarket

This figure plots the dynamics of raw and issuer-adjusted cumulative customer order flow imbalance in the first 20 trading days following issuance settlement. Issuer-adjusted order flow imbalance is calculated by subtracting the daily average cumulative imbalance of same-firm peer bonds from the raw imbalance of the newly issued bond. Event day is defined as the number of trading days since the issuance settlement date. For each event day, we plot the average cumulative customer order flow imbalance (customer buy volume net of customer sell volume) scaled by amount outstanding across all bond issues in the sample, along with 95% confidence intervals.

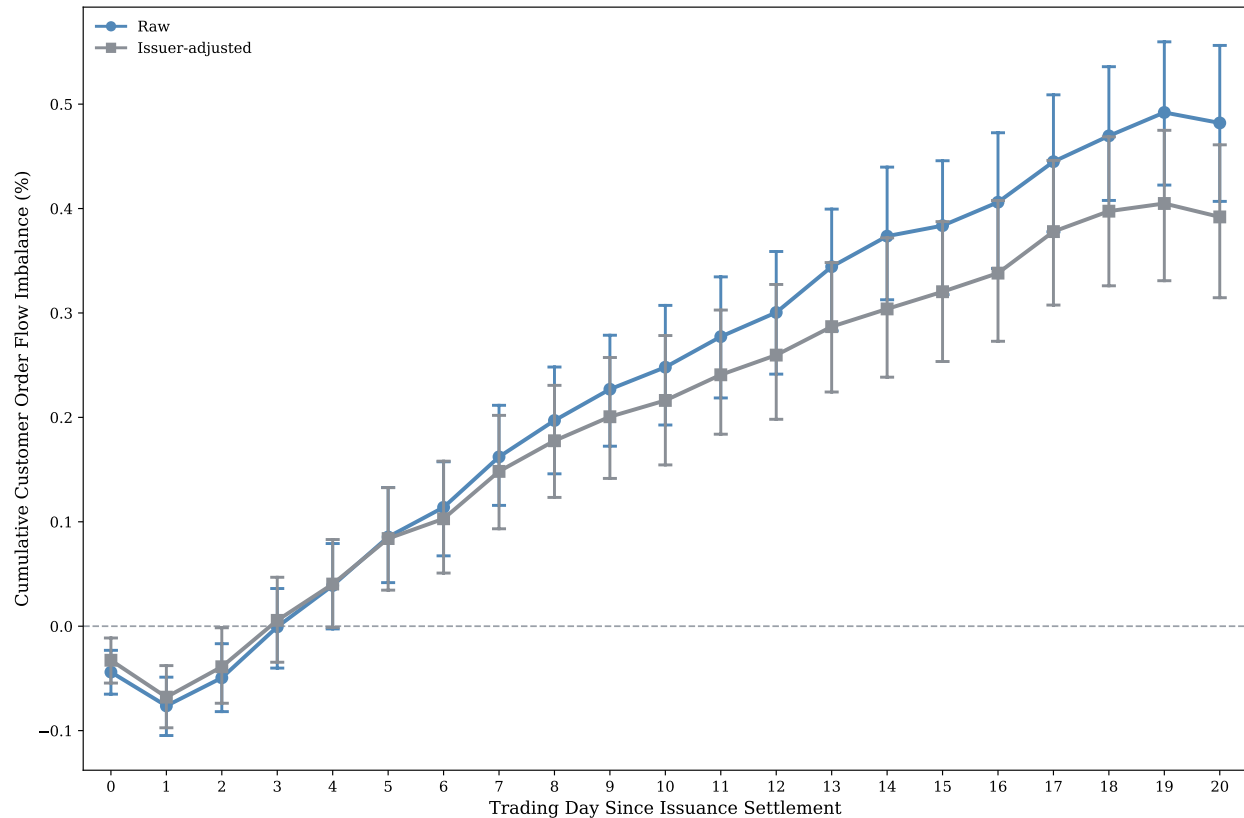
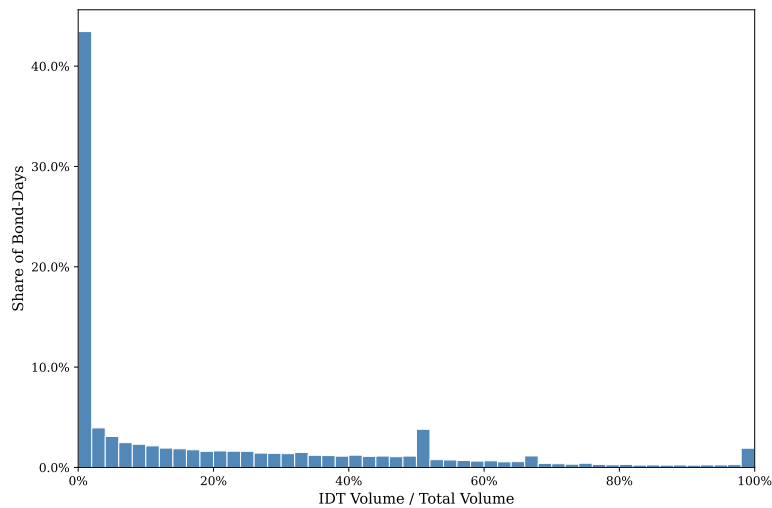


Figure A5: Interdealer Trading in the Issuance Aftermarket

This figure characterizes interdealer trading in the first 20 trading days following issuance settlement. Panel A plots the distribution across bond-days of the interdealer share of trading volume, computed as interdealer volume divided by total trading volume. Panel B examines whether interdealer trading helps dealers accommodate customer order imbalances. For each dealer-bond-day, an interdealer trade is classified as offsetting if it moves in the direction that reduces the dealer's customer order imbalance (buying from other dealers when customers are net buyers, selling to other dealers when customers are net sellers) and as worsening otherwise. The bars report offsetting and worsening interdealer volume as a share of the total absolute customer order imbalance, separately for dealer-bond-days when customers are net buyers and net sellers.

Panel A: Distribution of Interdealer Volume Share



Panel B: Interdealer Trading and Customer Order Imbalances

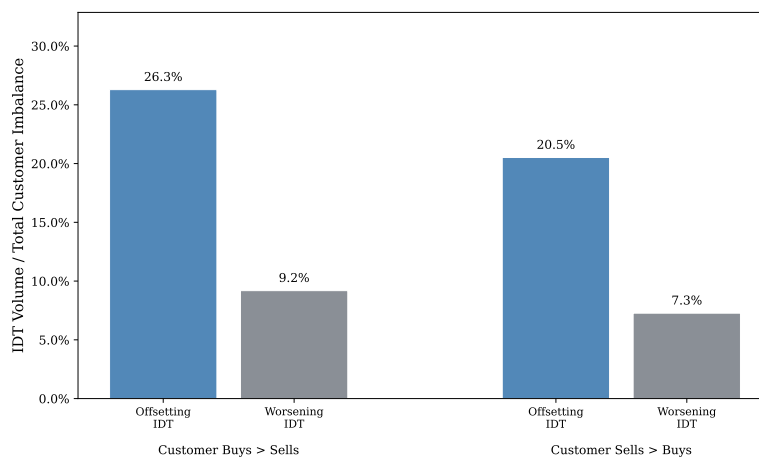


Figure A6: Customer Transaction Costs of New Bond Offerings

This figure plots the dynamics of customer transaction costs on the newly issued bond in the first 20 trading days following issuance settlement. Event day is defined as the number of trading days since the issuance settlement date. For each event day, we plot the average transaction-level half spread separately for customer purchases and customer sales across all bond issues in the sample, along with 95% confidence intervals.

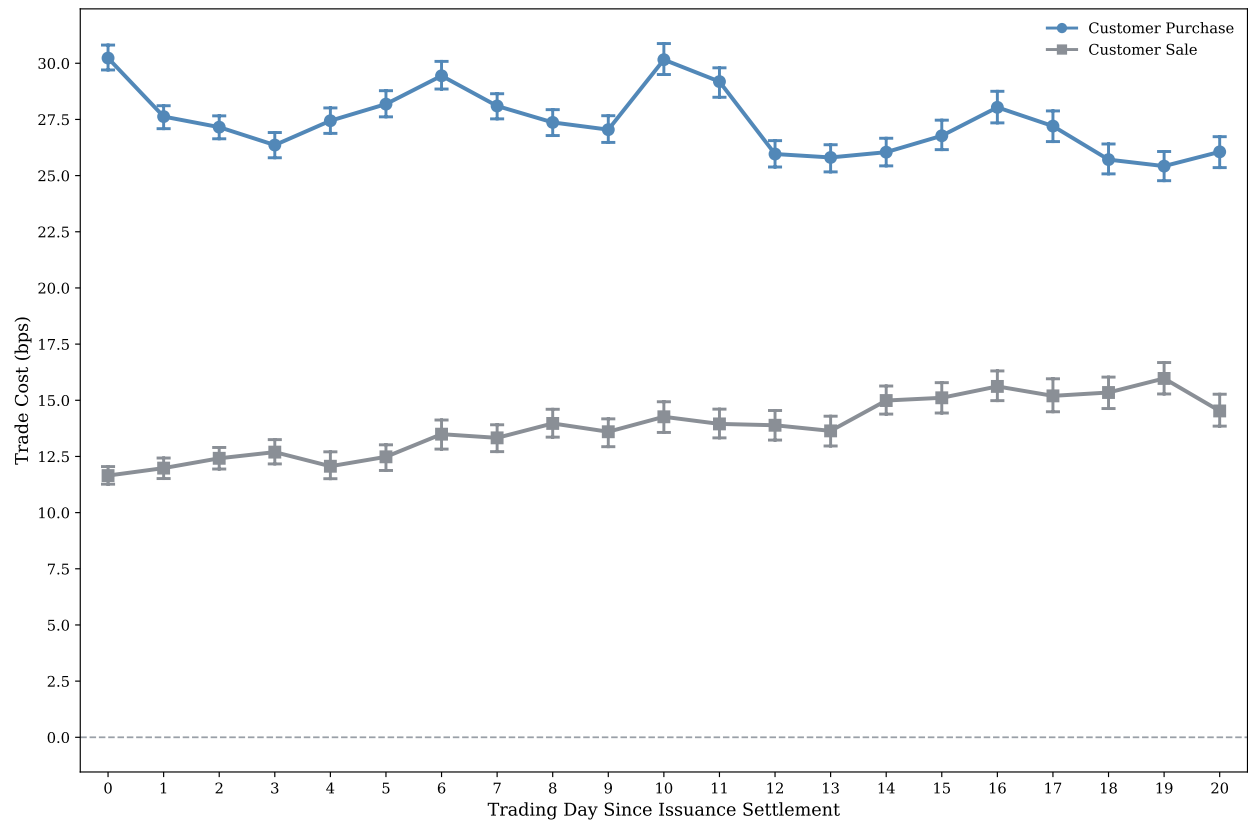


Table A1: **Variable Definitions**

This table presents the definitions of the main variables used in the paper.

Variable	Definition
<i>Panel A. Bond-day-level characteristics</i>	
Customer Buy % (t+1)	Total par value of dealer-to-customer sell transactions (customer purchases) on day $t + 1$, scaled by bond amount outstanding. Expressed in percentage points.
Customer Imbalance % (t+1)	Net customer order flow on day $t + 1$, computed as customer buy volume minus customer sell volume, scaled by the bond's offering amount. Positive values indicate net customer purchases. Expressed in percentage points.
Customer Sell % (t+1)	Total par value of customer-to-dealer buy transactions (customer sales) on day $t + 1$, scaled by bond amount outstanding. Expressed in percentage points.
Lendable Supply %	Par value of the bond made available for lending by asset owners (custodians, lending agents), scaled by bond amount outstanding. Expressed in percentage points.
Loan Fee %	Annualized indicative cost of borrowing the bond in the securities lending market, as estimated by S&P Global. Expressed in percentage points.
N(Loan)	Number of open bond loan contracts on day t .
Δ N(Loan) (t+1)	Daily change in the number of open bond loan contracts from day t to day $t + 1$.
N(NegInv Dealer)	Number of dealers in a net-short position on the bond on day t (cumulative net sales exceed cumulative net purchases).
Δ N(NegInv Dealer) (t+1)	Daily change in N(NegInv Dealer) from day t to day $t + 1$.
N(PosInv Dealer)	Number of dealers in a net-long position on the bond on day t (cumulative net purchases exceed cumulative net sales).
Δ N(PosInv Dealer) (t+1)	Daily change in N(PosInv Dealer) from day t to day $t + 1$.

Continued on next page

Variable	Definition
NegInv %	Aggregate negative dealer inventory on the bond, scaled by bond amount outstanding. A dealer's inventory is its cumulative net purchases since issuance; negative inventory is the absolute value of this position when the dealer has cumulatively sold more than it has purchased. Negative inventory is summed across all dealers in a net-short position. Expressed in percentage points.
Δ NegInv % (t+1)	Daily change in NegInv % from day t to day t + 1. Expressed in percentage points.
On Loan %	Par value of the bond on loan in the securities lending market, scaled by bond amount outstanding. Expressed in percentage points. The securities lending record date is adjusted backward by two or three trading days to align with the TRACE transaction date, accounting for the difference in settlement cycles between the securities lending market (T+0) and the corporate bond market (T+2 or T+3).
Δ On Loan % (t+1)	Daily change in On Loan % from day t to day t + 1. Expressed in percentage points.
Δ Peer NegInv % (t+1)	Daily change in the amount-outstanding-weighted average NegInv % across same-firm peer bonds, from day t to day t + 1. Expressed in percentage points.
Δ Peer On Loan % (t+1)	Daily change in the amount-outstanding-weighted average On Loan % across same-firm peer bonds, from day t to day t + 1. Expressed in percentage points.
PosInv %	Aggregate positive dealer inventory on the bond, scaled by bond amount outstanding. Positive inventory for a dealer is its cumulative net purchases when these exceed cumulative net sales, summed across all dealers in a net-long position. Expressed in percentage points.
Δ PosInv % (t+1)	Daily change in PosInv % from day t to day t + 1. Expressed in percentage points.
Return %	Daily bond return, computed as $P_t/P_{t-1} - 1$, where P_t is the volume-weighted average transaction price on day t from TRACE. Expressed in percentage points.

Continued on next page

Variable	Definition
Turnover %	Daily par value of all transactions in the bond reported in TRACE, scaled by bond amount outstanding. Expressed in percentage points.
<i>Panel B. Investor allocation and characteristics</i>	
$1[\text{Allocation}] \times 100$	Indicator equal to 100 if the investor receives a primary market allocation for the bond offering, and 0 otherwise. For insurers, an allocation is identified from transaction-level statutory filings as a purchase at the offering price on the offering date. For mutual funds, whose trades are not observed, an allocation is proxied by the new bond appearing in the fund's portfolio holdings at the delivery quarter-end.
$1[\text{Flip 2d}] \times 100$	Indicator equal to 100 if the insurer sells any portion of its primary market allocation within 2 trading days of the offering (allocation) date, and 0 otherwise. Conditional on receiving an allocation.
$1[\text{Flip 20d}] \times 100$	Indicator equal to 100 if the insurer sells any portion of its primary market allocation within 20 trading days of the offering (allocation) date, and 0 otherwise. Conditional on receiving an allocation.
$1[\text{Lending Insurer}]$	Indicator equal to 1 if the insurer reports positive securities lending ("Securities Lending: Gross Investment Holding") in its NAIC Summary Investment Schedule during the most recent fiscal year preceding the bond offering, and 0 otherwise.
$1[\text{Lending MF}]$	Indicator equal to 1 if the mutual fund is identified as engaging in securities lending, and 0 otherwise. Identification varies by reporting regime: for the pre-2019 period, based on Item 70Q of Form N-SAR (whether the fund loaned portfolio securities); for the post-2018 period, based on Form N-PORT (whether the fund reports any positions on loan) or, when N-PORT is unavailable, Form N-CEN (positive securities lending income).

Continued on next page

Variable	Definition
Dealer Relationship	For insurers, the insurer's dollar trading volume with the offering's underwriter(s) during the four quarters preceding the offering, scaled by the underwriters' total bond trading volume over the same period; for mutual funds, the fund's dollar trading volume with the underwriter(s), scaled by the fund's total dealer trading volume over the same period. Averaged across the offering's lead underwriters. Expressed in percentage points.
Firm Holding Share	The investor's total book value of existing bond holdings in the issuing firm, scaled by the investor's total bond portfolio book value. Expressed in percentage points. Measured at the quarter preceding the bond offering.
Flow %	For insurers, operating cash flow scaled by lagged total assets (capped to $[-1, 3]$); for mutual funds, quarterly net fund flow scaled by lagged TNA (capped to $[-1, 3]$). Measured at the quarter preceding the offering and expressed in percentage points.
Information Production	The investor's total book value of bond holdings in the issuer's two-digit SIC industry, scaled by the investor's total bond portfolio book value. Expressed in percentage points. Measured at the quarter preceding the bond offering.
$\log(\text{Assets})$	Natural logarithm of the insurer's total assets in millions of dollars, measured at the quarter preceding the bond offering. For mutual funds, the natural logarithm of total net assets (TNA) in millions of dollars.

Panel C. Mutual fund position-level characteristics

$1[\text{Loaned}] \times 100$	Indicator equal to 100 if the mutual fund reports a given bond position as on loan in its Form N-PORT filing, and 0 otherwise.
$1[\text{New Issue}]$	Indicator equal to 1 if the bond position is a newly issued bond, defined as the fund holding the bond as of the bond's delivery quarter-end, and 0 otherwise.
$1[\text{New Issue \& High Bookbuilding Demand}]$	Indicator equal to 1 if the position is a new issue (as above) whose offering had high bookbuilding demand, defined as bookbuilding compression above the 75th percentile of offerings settling in the same calendar quarter.

Continued on next page

Variable	Definition
1[New Issue & Low Bookbuilding Demand]	Indicator equal to 1 if the position is a new issue (as above) whose offering had low bookbuilding demand, defined as bookbuilding compression below the 75th percentile of offerings settling in the same calendar quarter.
Bond Size	Natural logarithm of the bond's offering amount.
Rating	Numerical credit rating of the bond, mapped such that AAA = 1 and higher values denote greater credit risk.
Time to Maturity	Remaining time to maturity of the bond position in years, measured at the observation quarter-end.

Panel D. Issuance-level characteristics

1[High Bookbuilding Demand]	Indicator equal to 1 if the offering's bookbuilding compression exceeds the 75th percentile of compression among offerings in the same calendar quarter, and 0 otherwise. Compression is the difference between the initial yield-to-maturity at the time of the initial price talk and the final offering yield-to-maturity, reflecting the extent to which investor demand during bookbuilding tightens the offering spread.
1[Rule 144A]	Indicator equal to 1 if the bond is issued under SEC Rule 144A (private placement to qualified institutional buyers), and 0 otherwise.
1[Rule 415]	Indicator equal to 1 if the bond is issued under SEC Rule 415 (shelf registration), and 0 otherwise.
Aftermarket Lendable Supply %	Average daily Lendable Supply % over the first 20 trading days after issuance settlement, scaled by bond amount outstanding. Expressed in percentage points.
Aftermarket On Loan %	Average daily On Loan % over the first 20 trading days after issuance settlement, scaled by bond amount outstanding. Expressed in percentage points.
Amihud	Amihud illiquidity measure averaged over the first 20 trading days after issuance settlement. Computed daily as the absolute percentage-point return per million dollars of trading volume.
Book-to-Market	The issuing firm's book value of equity divided by market value of equity, measured at the quarter preceding the bond offering.

Continued on next page

Variable	Definition
Customer Buy Cost %	Average customer purchase transaction cost over the first 20 trading days after issuance settlement. For each customer purchase, the transaction cost is the log difference between the price the customer pays and a benchmark interdealer price, so that a positive value means the customer paid above the prevailing interdealer price. The benchmark is the price of the most recent interdealer trade preceding the customer trade (within 5 days), following O'Hara and Zhou (2021) . Expressed in percentage points.
Customer Sell Cost %	Average customer sale transaction cost over the first 20 trading days after issuance settlement. Constructed analogously to Customer Buy Cost %. Expressed in percentage points.
Insurer Lender Allocation %	Total par value of primary market allocations to lending insurers (those with positive securities lending activity in the most recent fiscal year), scaled by the bond's offering amount. Expressed in percentage points.
Insurer Non-Lender Allocation %	Total par value of primary market allocations to non-lending insurers, scaled by the bond's offering amount. Expressed in percentage points.
Insurer Ownership %	Aggregate insurance company ownership of the issuing firm's outstanding bonds, as a percentage of total amount outstanding.
Issuance Share %	Within an issuing firm-quarter, the share of the firm's dollar issuance directed to a given maturity-by-rating segment, at the firm by quarter by segment level. Expressed in percentage points. The companion indicator 1[New Issue] equals 100 if the firm issues into the segment that quarter, and 0 otherwise.
Issue Rating	Numerical credit rating of the bond at issuance, mapped such that AAA = 1, AA+ = 2, ..., increasing with credit risk. We use the S&P rating when available, otherwise Moody's, otherwise Fitch.

Continued on next page

Variable	Definition
Lender Habitat	A scale-free, type-neutral measure of the lending orientation of a bond's natural investor clientele. For each maturity-by-rating segment, we compute the value-weighted lender share of insurer holdings (lending insurers' holdings divided by total insurer holdings) and the value-weighted lender share of mutual fund holdings (lending funds' holdings divided by total fund holdings) of seasoned bonds issued by peer firms in that segment, excluding the issuing firm's own bonds. Lender Habitat is the equal-weighted average of the two within-type shares, making it invariant to the insurer-versus-fund ownership mix. Segments are defined by four maturity buckets (under 5, 5–10, 10–15, and 15+ years) interacted with seven rating letters (AAA, AA, A, BBB, BB, B, and CCC or below). Expressed in percentage points.
Lender Share %	Insurer Lender Allocation % divided by Total Insurer Allocation %, i.e., the share of total insurer allocation captured by lending insurers. Expressed in percentage points.
Leverage	The issuing firm's total debt scaled by total assets (book leverage), measured at the quarter preceding the bond offering.
log(Issue Size)	Natural logarithm of the bond's offering amount in millions of dollars.
log(Market Equity)	Natural logarithm of the issuing firm's market value of equity, measured at the quarter preceding the bond offering.
log(Maturity)	Natural logarithm of the bond's maturity at issuance in years.
MF Lender Allocation %	Total book value of the new bond held at the delivery quarter-end by lending mutual funds, scaled by the bond's offering amount. Expressed in percentage points.
MF Non-Lender Allocation %	Total book value of the new bond held at the delivery quarter-end by non-lending mutual funds, scaled by the bond's offering amount. Expressed in percentage points.
MF Ownership %	Aggregate mutual fund ownership of the issuing firm's outstanding bonds, as a percentage of total amount outstanding.

Continued on next page

Variable	Definition
Negative Inventory %	Average daily aggregate negative dealer inventory (NegInv %) over the first 20 trading days after issuance settlement, scaled by bond amount outstanding. Expressed in percentage points.
Quote Return %	Cumulative bond return over the first 20 trading days after issuance settlement, computed from daily bid prices provided by S&P Capital IQ. Expressed in percentage points.
Segment Firms	The number of distinct issuers with seasoned bonds outstanding in the maturity-by-rating segment.
Segment Issuance Share %	The segment's share of total dollar issuance volume in the quarter, at the maturity-by-rating segment by quarter level. Expressed in percentage points. The companion indicator 1[New Issue] equals 100 if the segment receives any new issue in the quarter, and 0 otherwise.
Segment Size	The natural logarithm of the total par amount outstanding of seasoned peer-firm bonds in the maturity-by-rating segment.
Total Insurer Allocation %	Total par value of primary market allocations to all insurers, scaled by the bond's offering amount. Expressed in percentage points.
TRACE Return %	Cumulative bond return over the first 20 trading days after issuance settlement, computed from TRACE volume-weighted average transaction prices. Expressed in percentage points.
Underpricing	The first secondary market return of the bond adjusted for systematic risk: $(P_{t+n} - P_t^{offer})/P_t^{offer} - (I_{t+n} - I_t)/I_t$, where P_{t+n} is the first available secondary-market price, P_t^{offer} is the offering price, and I_t and I_{t+n} are the levels of the maturity- and rating-matched benchmark index on the issuance date and first-price date, respectively. Expressed in basis points.
Offering Yield Spread	The yield-to-maturity of the bond at issuance minus the yield of a cash-flow-matched synthetic Treasury bond, computed using the Liu and Wu (2021) zero-coupon yield curve. Expressed in basis points.

Table A2: **Placebo: Within-firm Peer Bonds**

This table presents placebo regressions that cross newly issued bonds with their same-firm seasoned peers. Column 1 regresses the daily change in the newly issued bond's loan demand on the daily change in peer dealer negative inventory; Column 2 regresses the daily change in peer loan demand on the daily change in the newly issued bond's dealer negative inventory. The observations are at the bond-day level. t-statistics are reported in parentheses. Standard errors are clustered at the bond and date level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Δ On Loan % (t+1)	(2) Δ Peer On Loan % (t+1)
Δ Peer NegInv % (t+1)	0.000 (0.07)	
Δ NegInv % (t+1)		-0.000 (-0.02)
Controls	Yes	Yes
Bond Offering FE	Yes	Yes
Date FE	Yes	Yes
Adjusted R ²	0.156	-0.038
N	154,324	154,324

Table A3: Customer Order Flow and Bond Loan Demand

This table presents robustness checks of our baseline results using customer order flow imbalances as the explanatory variable instead of dealer positive and negative inventory. The observations are at the bond-day level. t-statistics are reported in parentheses. Standard errors are clustered at the bond and date level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
	Δ On Loan % (t+1)	Δ On Loan % (t+1)
Customer Buy % (t+1)	0.153*** (48.41)	
Customer Sell % (t+1)	-0.097*** (-34.52)	
Customer Imbalance % (t+1)		0.133*** (47.93)
Controls	Yes	Yes
Bond Offering FE	Yes	Yes
Date FE	Yes	Yes
Adjusted R ²	0.204	0.201
N	177,206	177,206

Table A4: **Bookbuilding Demand and Allocation to Lending Insurers**

This table examines the relationship between primary market bookbuilding demand and allocations to lending insurers. The dependent variables are the lender share of total insurer allocation (Column 1), insurer lender allocation (Column 2), and insurer non-lender allocation (Column 3). The key explanatory variable is an indicator for offerings with high bookbuilding demand. The observations are at the issuance level. t-statistics are reported in parentheses. Standard errors are clustered at the bond level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Lender Share %	(2) Insurer Lender Allocation %	(3) Insurer Non-Lender Allocation %
1[High Bookbuilding Demand]	2.032*** (3.14)	0.190*** (2.74)	-0.160** (-2.29)
Total Insurer Allocation %	0.134*** (4.37)	0.317*** (57.85)	0.673*** (112.73)
Offering Quarter FE	Yes	Yes	Yes
Adjusted R ²	0.068	0.621	0.874
N	5,309	5,309	5,309

Table A5: Securities Lending and Bond Flipping

This table examines whether insurers that lend securities are less likely to flip newly allocated bonds. The dependent variable is an indicator for whether the insurer flips part of its allocation within 2 or 20 trading days of the offering (allocation) date, scaled by 100. The observations are at the insurer-bond level. t-statistics are reported in parentheses. Standard errors are clustered at the bond and offering quarter level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	1[Flip 2d] × 100	1[Flip 2d] × 100	1[Flip 20d] × 100	1[Flip 20d] × 100
1[Lending Insurer]	-3.280*** (-15.49)	-3.303*** (-13.25)	-3.578*** (-11.22)	-3.190*** (-9.92)
1[Lending Insurer] × 1[High Bookbuilding Demand]		-0.200 (-0.40)		-0.251 (-0.39)
Controls	Yes	Yes	Yes	Yes
Bond Offering FE	Yes	Yes	Yes	Yes
Adjusted R ²	0.114	0.099	0.115	0.104
N	275,634	190,079	275,634	190,079

Table A6: Lender Habitat and the Bond Issuance Decision

This table tests whether a segment's predetermined lender habitat predicts the supply of new issuance into that segment. Lender Habitat is the same scale-free, type-neutral measure used in the reduced-form tests, computed in the quarter preceding issuance from the holdings of peer issuers' seasoned bonds and described in Section 5. Coefficients are expressed per one percentage point of Lender Habitat. Panel A is at the maturity-by-rating segment by quarter level: the dependent variables are an indicator (scaled by 100) for whether the segment receives any new issue in the quarter (Column 1) and the segment's share of total issuance volume that quarter (Column 2), with controls for segment size and the number of segment issuers. Panel B is at the firm by quarter by segment level over the full set of segments each firm could have issued into: the dependent variables are an indicator (scaled by 100) for whether the firm issues into the segment (Columns 1 and 3) and the firm's issuance volume share across segments (Columns 2 and 4); Columns 1 and 2 include firm, quarter, and segment fixed effects, while Columns 3 and 4 restrict to issuing firm-quarters and absorb firm-by-quarter and segment fixed effects. t-statistics are reported in parentheses. Standard errors are clustered by segment in Panel A and by firm in Panel B. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Segment-Quarter Level

	(1) 1[New Issue] $\times$ 100	(2) Segment Issuance Share %
Lender Habitat	-0.210 (-1.50)	-0.007 (-0.32)
Segment Size	5.703* (1.92)	-0.508 (-1.17)
Segment Firms	-0.032 (-0.90)	0.024** (2.72)
Segment FE	Yes	Yes
Quarter FE	Yes	Yes
Adjusted R ²	0.625	0.819
N	990	990

Panel B: Firm-Quarter-Segment Level

	(1) 1[New Issue] $\times$ 100	(2) Issuance Share %	(3) 1[New Issue] $\times$ 100	(4) Issuance Share %
Lender Habitat	-0.001 (-0.82)	-0.001 (-0.85)	-0.011 (-0.86)	-0.006 (-0.69)
Firm FE	Yes	Yes	No	No
Quarter FE	Yes	Yes	No	No
Firm $\times$ Quarter FE	No	No	Yes	Yes
Segment FE	Yes	Yes	Yes	Yes
Sample	Full	Full	Issuing	Issuing
Adjusted R ²	0.016	0.012	0.057	0.043
N	1,889,769	1,889,769	176,872	176,872