Securities Lending and Corporate Financing: Evidence from Bond Issuance

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Abstract

The securities lending market allows institutional investors, such as insurance companies, to lend out asset holdings in exchange for cash collateral, an important but understudied channel of collateral management. Since securities lenders are also primary investors in corporate bonds, we hypothesize that their lending preference for certain types of bonds can influence corporate financing policies. Indeed, we observe that a higher lender preference for long-term bonds stimulates firms to issue more such bonds next year and helps boost future bond prices. The analysis exploiting a quasi-experiment that regulates insurance companies lending disclosures supports the causal interpretation. Our results shed new light on the potential impact of securities lending.(JEL Codes: G12, G22, G23, G32)

Keywords: securities lending, institutional investors, cost of capital, bond issuance, bond pricing, insurance companies.

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Over recent decades, the securities lending market has grown substantially with a $37 trillion lendable inventory and a $2.7 trillion lending amount as of 2021. This rapid growth has sparked interest in the economic implications of securities lending. Vast evidence shows, for instance, that the presence of the securities lending market can help improve market efficiency (e.g., Ljungqvist and Qian, 2013; Drechsler and Drechsler, 2016) and exert real influence on investment and corporate governance (e.g., Grullon, Michenaud, and Weston, 2015; Fang, Huang, and Karpoff, 2016).

These studies on securities lending focus on the activities and influence of securities *borrowers*, notably short-sellers, whereas the role played by securities *lenders* has been much less explored. This research gap is probably due to the limited role of securities lenders in the equity lending market (e.g., index funds passively lend out stocks for fees). However, extending a similar argument to the corporate bond lending market is difficult. Indeed, a striking feature of the corporate bond market is the lack of intensive informed short-selling (Asquith, Au, Covert, and Pathak, 2013), which gives rise to drastically different incentives for lenders and borrowers to participate in bond lending (Foley-Fisher, Narajabad, and Verani, 2019).[1]

A telling example of the incentives of bond lenders can be found in the period of the Great Recession of 2007-2009. Up to the crisis, insurance companies such as AIG, which played a dual role as both the primary *investors* in the corporate bond cash market and the main *lenders* in the corporate bond lending market, relied heavily on the lending market to expand their balance-sheet transactions. For instance, they lent bonds in exchange for cash collateral posted by bond borrowers and resorted to *collateral management*—i.e., reinvestment of cash collateral in other securities in off-balance-sheet transactions—to achieve certain goals such as yield enhancement and asset/liability management (Peirce, 2014; McDonald and Paulson, 2015).[2] While the practice of AIG turned out to be controversial,

[1] Borrowers often borrow corporate bonds for noninformation reasons, ranging from inventory management or market-making to regulatory arbitrage (Foley-Fisher, Narajabad, and Verani, 2019, provide detailed discussions and references). Unlike the lending market for equities or government bonds, the corporate bond lending market is hardly affected by motivations such as dividend arbitrage, voting rights (Aggarwal, Saffi, and Sturgess, 2016), or flight to safety (Aggarwal, Bai, and Laeven, 2021).
[2] As documented in Peirce (2014) and McDonald and Paulson (2015), AIG and its life insurance subsidiaries had reinvested its cash collateral in riskier long-term assets such as residential mortgage-backed securities, resulting in a large exposure to toxic securities during the subprime crisis. At the height of the crisis, the program experienced a run, and AIG could not meet the repayment demands. The losses in the securities lending program were severe and played a major role in AIG's collapse. While the aggressive practice of AIG is extreme, it offers an example of active collateral management. Fostel and Geanakoplos (2014) provide a review

collateral management is widespread among insurance companies and other bond investors, such as mutual funds and pension funds (see, e.g., JP Morgan, 2006). Such observations highlight a more active role that bond lenders play, which may provide new mechanisms through which the securities lending market can influence the economy in a way unnoticed by the existing literature.

In this paper, we explore one such new mechanism by asking whether the dual lender-investor role played by financial intermediaries may allow the bond lending market to influence corporate financing policies. Our key intuition is that when certain types of corporate bonds are preferred by lenders in the lending market (e.g., for the purpose of collateral management), lenders may condition their purchases in the bond market on their lending needs. In this case, a high willingness among lenders to lend out certain types of bonds in the lending market, which we refer to as *lender preference*, can spill over to the cash bond market to influence bond prices and incentivize companies to issue similar bonds. This mechanism differs from the information channel through which the equity lending market exerts an influence on corporate policies; it also differs from the traditional view that corporate financing policies and bond prices are mostly determined by firm fundamentals.[3]

We test this intuition by exploiting the U.S. corporate bond lending market with 16 million corporate bond loan records from 2005 to 2014. In the spirit of Greenwood, Hanson, and Stein (2010), we focus on one important feature of bonds in gauging the potential influence of the lending market: bond maturity. Bond maturity is especially suitable for our purposes since it plays a key role in corporate decisions and can be influenced by creditors or capital supply in the primary bond market (e.g., Roberts and Sufi, 2009; Custodio, Ferreira, and Laureano, 2013). Moreover, bond maturity is highly relevant to the bond lending market (Asquith, Covert, and Patak, 2013) and is one of the most important considerations in collateral management (JP Morgan, 2006). Both yield enhancement and asset/liability

of collateral equilibrium. More practical issues related to collateral management can be found in a sponsored statement from JP Morgan (2006, "Securities Lending: An Asset/Liability Business").

[3] We do not claim that *lender preference* reflects considerations only related to collateral management; it may well be influenced by lenders' other purposes and by the lending market's equilibrium conditions. Rather, we use this channel to demonstrate the potential influence of securities lending when informed short-selling is *not* involved.

management, the two prominent goals of collateral management, involve maturity as a first-order bond characteristic.[4]

We accordingly construct our measure of lender preference over maturity as the total lendable amount of a firm's long-term bonds scaled by their outstanding amount. Our measure captures lenders' willingness to lend out long-term bonds: a higher lendable ratio indicates a higher revealed preference of lenders to use long-term bonds to, among other things, achieve the goal of collateral management. Building upon these measures, we can explicitly test our previous intuition by investigating whether *fluctuations* in lender preference for long-term bonds affect the issuance and pricing of such bonds.

To set the stage, we provide several diagnostic analyses to shed light on the incentives and preferences of bond lenders before we conduct formal tests. We first show that bond lenders generally accept lower lending fees for (the lending of) longer-term bonds.[5] Lending fees can even go *negative*, whereby lenders pay the borrowers a financing cost to receive cash collateral. The popularity of negative lending fees (approximately 27% in the sample) can be rationalized only by collateral management. That is, the benefits of reinvested cash collateral must outweigh the cost to justify this practice. These observations suggest that collateral management may provide an important motivation for lenders to lend out long-term bonds.

Second, if yield enhancement is a prime component of collateral management, we should expect a direct link between the yield-enhancement incentive of bond investors and their

[4] Consider an institutional investor (e.g., an insurance company) holding a ten-year corporate bond on its balance sheet. The investor can lend out the bond for collateral management, using the cash obtained from the lending to buy another corporate bond (as an off-balance-sheet asset), say a five-year bond. This transaction can help achieve two goals. First, it extends the duration of the balance-sheet assets because the second bond gives the investor additional interest rate exposure. This property is helpful in asset/liability management. Second, it allows the investor to receive extra yields if the five-year bond return is higher than cash rebate rates (e.g., because of its credit spread, the term spread, or even mispricing). In these cases, collateral management allows the investor to create a "leveraged" position in duration and asset returns. In addition to leverage, collateral management enables the investor to use (i.e., lend out) balance-sheet assets to fund off-balance-sheet investments. This property provides a tool for some investors, such as insurance companies, to mitigate balance-sheet regulatory constraints. AIG provided an extreme example when reinvesting cash collateral in toxic securities during the subprime crisis.

[5] More explicitly, bond maturity is positively related to lendable and lending amount and negatively related to lending fee. In other words, long-term bonds are what bond lenders are willing to accept a lower lending fee and supply the most (high lendable amount). In the spirit of Cohen, Diether, and Malloy (2007), this empirical pattern suggests that lenders actively lend out long-term bonds instead of short-sellers requesting these bonds, because the latter case will lead to high lending fees. Consistent with this notion, Bai (2018) and Anderson, Henderson, and Pearson (2018) show that the informed shorting demand in the corporate bond lending market is captured exclusively by a combination of high lending fee and high lendable (lending) amount. We focus on the opposite case of securities lending when informed demand is the least relevant.

willingness to participate in the lending market as lenders.[6] To potentially detect—or reject—this link, we leverage the intuition that holding bonds with reaching-for-yield (RFY) properties reflects the yield-enhancement incentive of bond investors (e.g., Becker and Ivashina, 2015; Choi and Kronlund, 2017). Consistent with this notion, we find that future lending activities increase when holdings of long-term bonds by high-RFY investors increase.

Finally, collateral management and its associated off-balance-sheet assets also provide a tool to mitigate regulatory constraints (e.g., AIG reinvested cash collateral in toxic securities during the subprime crisis). All else being equal, investors facing more stringent balance-sheet restrictions should have more incentives to exploit this tool. To explore this incentive, we visit the sample of insurance companies that disclose their securities lending activities following a 2010 regulation (we will discuss it shortly). We indeed observe that more constrained companies participate more in the securities lending market. Moreover, we also find direct evidence that insurance companies' lending activities increase in bond maturity, confirming a general lender preference over long-term bonds. Jointly, our diagnostic analyses indicate that bond lenders' preference is more aligned with the benefits of collateral management than with passively receiving lending fees.

Armed with these preliminary findings, we investigate the impact of lender preference on corporate financing policies. Following Greenwood, Hanson, and Stein (2010), we create a proxy for the firm's choice of issuing long-term bonds (*long-term bond issuance*) and regress it on lender preference for existing long-term bonds and a set of control variables. In the panel analysis, we show that a one standard deviation increase in the firm-level lender preference for long-term bonds increases the probability of long-term bond issuance in the next year by 2.23%. Given that the average annual long-term bond issuance rate is 14.3%, lender preference plays a noticeable role in driving the decision of future bond issuance.

If the above relationship is channeled through dual lender-investors, a higher lender preference for long-term bonds should also transmit to higher investor demand, leading to lower expected returns and higher bond prices for similar bonds in the secondary market. Indeed, we document an economically and statistically significant relationship between lender preference and bond pricing. For instance, a one standard deviation increase in lender

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[6] It is difficult to sketch the asset/liability side of collateral management because primary institutional investors are not required to disclose their reinvested portfolio. A noticeable exception is the 2010 regulation requesting insurance companies to disclose such off-balance-sheet transactions, which we will discuss shortly.

preference is related to approximately 0.29% lower future bond yield spreads. Given that the average bond yield spread is 2.50%, the impact of lender preference on bond pricing is economically influential. Likewise, a higher lender preference is associated with a lower expected monthly bond return of a comparable magnitude.

It is important to note that the positive impact of securities lending on bond prices is novel to the short-selling literature and contradicts the conventional finding in the equity lending market. Indeed, informed short-selling typically translates into *lower* future stock prices when short sellers process negative information about firms. Thus, although more informed short selling can induce lenders to supply more lendable shares in the equity market, this traditional mechanism is unlikely to generate a *positive* relationship between lendable supply and bond prices. It is also worth pointing out that controlling for long-term bond ownership does not affect our results, suggesting that the above effect is not an artifact of passive investors lending out bonds in proportion to their holding values. Instead, lender-investors are active in lending out bonds, presumably due to the time-varying benefits of collateral management.

To further establish lender preference as an independent channel influencing bond issuance, we exploit one regulatory experiment that exogenously impacted the preferences of corporate bond lenders. In 2010, the National Association of Insurance Commissioners (NAIC) required insurance companies to disclose their engagement in the securities lending market and report information on both their securities lending and reinvestment of the lending proceeds. This requirement reduced the incentive of insurance companies to engage in securities lending and collateral management for several reasons. First, disclosure can in general be costly (e.g., Goldstein and Yang 2019). Second, the new regulation reduced the incentive to exploit collateral management and its associated off-balance-sheet assets as a tool to avoid regulatory constraints. Finally, the new regulation made the reputation risk even starker for insurance companies in terms of being publicly associated with short-sellers who were blamed for depressing securities prices and interfering in the market. It is worth noting that the same policy should have differential influences on bonds with different ownership. The policy shock should have disrupted the lending activities more for bonds held by insurance companies than for bonds held mainly by other owners.

We execute this identification strategy by using insurance companies' bond holding information to proxy for their lender preference and interacting this variable with the NAIC regulation shock. Although bond holding is endogenously related to lender preference, its interaction with the regulation shock provides a reasonable instrument for the exogenous shock to the lendable amount that insurance companies were willing to provide to the lending market in the post-policy period. Following this intuition, we conduct a two-stage instrument variable test, and the test confirms our main results.

One interesting implication of the above test is that insurance companies may want to scale down their long-term bond holdings if the policy significantly reduces the lending benefits of these bonds. Our additional analysis confirms this implication. In a difference-in-difference (DID) setup, we find that the post-regulation long-term bond holdings drop for insurance companies compared to other institutional investors. This result further validates the relevance of the NAIC regulation and endorses the economic importance of securities lending.[7]

After mitigating the potential endogeneity concern, we conduct a list of additional analyses and robustness checks. First, to highlight the possibility that lender-investors may use the securities lending market to obtain funding for collateral management, we examine the subsample of bond lending activities for which lending fees are negative. This subsample is important because, as discussed, lenders' willingness to essentially *pay* borrowers in exchange for cash collateral reveals the value of the latter to lenders in their collateral management. We find a more significant influence of lender preference in this subsample: a one standard deviation increase in lender preference for bonds with a negative lending fee elevates the probability of long-term bond issuance in the next year by 2.97% and lessens future bond yield spreads by 0.23%. This result confirms the key role that collateral management plays in shaping the preference of dual lender-investors and, subsequently, firms' financing decisions.

Second, we show that our results hold for nonfinancial firms, suggesting that the influence of lender preference goes far beyond the financial industry. Third, we consider alternative proxies of lender preference, with *lending* amount substituting *lendable* amount in

[7] Note that such holding changes do not contaminate the validity of our instrument because the NAIC regulatory shock directly affects securities lending incentives rather than holdings (exclusion restrictions). As detailed in later sections, the regulatory shock is likely to affect both the intensive margin (i.e., lending out existing bonds) and the extensive margin (i.e., adjusting the holding position based on lending benefits) of insurance companies. The IV utilizes the plausible exogenous shock on the intensive margin, whereas the second test focuses on the extensive margin. Even in the extensive margin, it is securities lending considerations that affect holdings changes, not the other way round.

the original proxies. We show that the alternative lending-based measure of lender preference has a similar influence on bond issuance and bond pricing as the original lendable-based proxy. Last, we verify that covenants do not affect the relationship between lender preference and debt maturity choices or bond financing. This observation further alleviates the concern of a spurious correlation related to bond characteristics.

Overall, our results suggest that lender preference for corporate bonds affects bond prices and corporate financing decisions. Lender preference can fluctuate when the benefits and costs of collateral management and its regulations vary over time. Once such fluctuation emerges, it spills over to the primary and secondary corporate bond market and subsequently influences the debt-issuing choices of firms. These observations reveal a novel lender-initiated channel through which securities lending can influence corporate policies in the real economy.

Our findings contribute to several strands of the literature. First, our work is closely related to studies exploring the real impact of the securities lending market. The common economic basis for the known impacts, such as improved corporate governance, is informed short-selling, which punishes misconduct by firms through downward price pressure.[8] Our main contribution is to propose a novel mechanism related to dual investor-lenders' collateral management incentive, which allows the bond lending market to influence corporate policies in the real economy without processing superior (and negative) information about firms. Different from the channel of informed short-selling, increased securities lending in this mechanism translates into higher prices to influence corporate debt policies. These results echo the importance of the lender's perspective (Foley-Fisher, Narajabad, and Verani, 2019), as a complement to the short-seller focus of the literature, for understanding the economics of the securities lending market.

In exploring the lender-investor mechanism, we also provide the first evidence, to the best of our knowledge, of how corporate financing decisions can be influenced by the bond lending market. There are a number of prominent theories explaining corporate debt choices by focusing on firm fundamentals and relevant market conditions, with more recent explanations also emphasizing the importance of filling the gap in the maturity structure of

[8] See, among others, the studies showing that equity short-sellers may help improve market efficiency (e.g., Ljungqvist and Qian, 2013; Jiao, Massa, and Zhang, 2016; Drechsler and Drechsler, 2016; Bai, 2018) and corporate governance (e.g., Massa, Zhang, and Zhang, 2015; Fang, Huang, and Karpoff, 2016).

government debt (Greenwood, Hanson, and Stein, 2010; Badoer and James, 2016) and the potential influence of bond fund flows (Choi et al., 2019; Zhu 2020; Ben-Rephael, Choi, and Goldstein, 2020).[9] We extend this line of research by demonstrating that corporate financing decisions can be influenced by lender preference, which may not have a direct relationship with firm fundamentals.[10]

Lastly, our results provide a new perspective on bond pricing. There is little consensus on the cross-sectional determinants of bond yield spreads in the empirical asset pricing literature. Existing studies conventionally focus on default risk, liquidity risk, tax, and jump risk, all measured in the secondary bond market.[11] Our paper instead studies bond pricing by linking the primary and secondary bond markets to the bond lending market. What differentiates our paper is that we explore the novel channel related to the collateral management incentives of lenders. In a sense, we show that the collateral value of a bond—reflected in lender preference—affects its price, which adds to our understanding of the asset pricing role played by collateral (e.g., Duffie 1996; Kiyotaki and Moore, 1997; Brunnermeier and Pedersen, 2009).

I. Data and Main Variables

To examine the impact of lender preference on bond issuance and bond pricing, we compile four sets of corporate bond information: bond lending transactions, bond issuance, bond trading records, and bond holding information, for the sample period of January 2005 to December 2014. We now explain these data and our main variables in detail.

A. Corporate Bond Data

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[9] For instance, firm characteristics such as credit ratings, probability of default, riskiness, tangibility of assets, and cash flows (e.g., Diamond, 1991; Rajan, 1992; Houston and James, 1996; Cantillo and Wright, 2000; Denis and Mihov, 2003; Guedes and Opler, 1996) and market conditions related to the term structure of interest rates (Barclays and Smith, 1995) are shown to be important to the financing choices of firms. More recent explanations also include multimaturity niche-filling targeting the informational needs of institutional investors (Dass and Massa, 2013) and market frictions (Choi, Hackbarth, and Zechner, 2018).

[10] Although lender preference spills over to the cash bond market through demand, its impact differs from that of outright demand shocks originated from bond fund flows. Indeed, the flows of bond mutual funds affect bond issuance (Zhu 2020) but not bond prices (Choi et al., 2019), whereas lender preference influences both.

[11] The bond pricing literature is extensive, with contributions from, to cite a few, Collin-Dufresne, Goldstein, and Martin (2001); Bessembinder, Maxwell and Venkataraman (2006); Bessembinder and Maxwell (2009); Greenwood and Vayanos (2008); Bai and Wu (2016); Lin, Wang and Wu (2010); Bai, Collin-Dufresne, Goldstein, and Helwege (2016); and Bai, Bali, Wen (2019, 2021).

We first obtain corporate bond lending data from Markit. This data company collects daily securities lending information from large custodians and prime brokers and covers more than 85% of the securities lending market. We merge the bond lending data with the Mergent Fixed-Income Securities Database (FISD) to obtain bond characteristics such as offering amount, offering date, maturity date, coupon, coupon type, bond type, bond option features, and issuer information. To clean the corporate bond lending data, we adopt the following filtering criteria: (i) we remove bonds issued by firms not in the jurisdiction of the United States and bonds not issued in the currency of U.S. dollars; (ii) we remove bonds that are structured notes or mortgage-backed, asset-backed, agency-backed or equity-linked; and (iii) we remove convertible bonds since this option feature adds noise to bond pricing.

After identifying the list of eligible corporate bonds, we collect their lending transaction records for the sample period of January 2005 to December 2014. Among 68,197 non-convertible corporate bonds with maturity dates later than January 2005 in the Mergent bond issue data, 26,653 bonds (39%) have lending transaction records in the Markit bond lending data. We further remove records with missing or zero lendable amounts and records with lending amounts greater than corresponding lendable amounts or outstanding bond amount. To eliminate the impact of noisy lending records, we winsorize the ratio of the lendable amount to the bond outstanding amount at the 0.5% level, resulting in a sample of 19.6 million bond-day lending transaction records for 26,487 bonds issued by 4,509 firms. In the next subsection, we aggregate the data to the firm level at monthly or annual frequency, depending on the test requirements, to construct the primary independent variable, *lender preference*.

To examine the relationship between lender preference and bond issuance and bond pricing, we also need bond issuance data and bond pricing data. The issuance data come from the Mergent FISD. There are 33,918 corporate bonds qualifying under the above bond filtering criteria, which are issued by 3,244 firms from January 2005 to December 2014. We aggregate the bond-level issuance to the firm-year level to remove any seasonality in the bond issuance, which we discuss in the next subsection.

For bond pricing information, we download corporate bond transaction data from the enhanced version of the Trade Reporting and Compliance Engine (TRACE) for the same sample period from January 2005 to December 2014. The enhanced TRACE dataset offers the best quality data on corporate bond transactions, with intraday observations on price, trading volume, and buy and sell indicators. To construct bond returns and bond yield spreads in an accurate manner, we follow the rules proposed by Bai, Bali, and Wen (2019). In short, we keep only corporate bonds that are traded in the U.S. public market and issued by a U.S. firm and have the currency of the U.S. dollar. The qualified bonds need to be non-convertible, have non-floating coupons, and have reasonable prices (between $5 and $1,000) and reliable trading volumes (larger than $10,000). The final bond pricing data include 11 million bond-day observations for 43,542 bonds issued by 4,596 firms. We merge them with corporate bond lending data and keep bonds with both trading and lending records, resulting in a sample of 16,546 unique bonds issued by 3,393 firms. In the next subsection, we construct bond yield spreads and bond returns at monthly frequency and aggregate them to the firm level by maturity niche.

Finally, we collect corporate bond holding data from the Thomson Reuters eMaxx dataset to construct instrumental variables. We apply the same filtering criteria used for the bond lending data to select qualified bonds in the eMaxx data. Given the nature of the regulation event studied in the paper, we focus primarily on corporate bonds held by insurance companies, which are also predominant investors in the corporate bond market. The eMaxx data report for each insurance company the bond-level holding amounts, which we aggregate to the firm level across all insurance companies by maturity niche. We also consider corporate bonds held by mutual funds, the second largest bond investors and active bond lenders, when we explore the relationship between securities lending and the yield-enhancement incentives of bond lenders.

Table 1 presents the bond characteristics in the lending market and the primary and secondary bond markets. There are 26,487 active bonds in the lending market, 43,542 active bonds in the secondary market, and 33,918 newly issued bonds during our sample period of 2005-2014. Bonds in the lending market, on average, tend to have a larger size, longer maturity, and lower credit rating than those in the primary market but are not much different from those in the secondary market.

The most interesting observation in the table is the popularity of bond lending transactions with negative fees. In our sample, approximately 27% of bonds are ever lent (i.e., on loan) for negative fees. In addition, compared to the bonds on loan overall, such bonds tend to have an even larger size and a longer maturity; they also have a better rating (A-, with a numeric value of 7) than that of the overall bonds on loan (BBB, with a numeric value of 9).

In terms of collateral management, negative lending fees can be interpreted as the financing cost that lenders pay to borrowers to receive cash collateral. More generally speaking, lenders can reinvest these cash collateral in other assets to cover this cost (i.e., yield enhancement) or to achieve alternative goals (e.g., asset-liability matching).

B. Main Variables

Our first primary dependent variable is the *long-term bond issuance*, a dummy variable that equals one if firm *i* issues one or more long-term bonds in a given year *t*. While some literature examines the difference between long-term and short-term bonds using the cutoff time-to-maturity of one year, it is important for our study to adopt a cutoff point that matches lenders' differential preference on bond maturity. As we will discuss in Section II, diagnostic tests suggest that lender preference concentrates on bonds with remaining maturities of seven years or longer. Therefore, we refer to bonds with more than seven years remaining to maturity as long-term bonds.

Consequently, we divide bonds into two groups according to the maturity cutoff of seven years to examine how the changes in lender preference influence corporate decisions in issuing bonds with similar features. The notion of long-term bonds is adopted to provide a benchmark based on lenders' maturity preference; it has a specific and thus a relative meaning for the securities lending market. Likewise, the variable *long-term bond issuance* aims to capture the desire of firms to fill the gap when lenders' maturity preference fluctuates. Thus, this variable may not apply to the issuance of long-term bonds in other scenarios.

The second primary dependent variable is bond pricing, for which we consider both bond yield spread and corporate bond return. First, we calculate the daily yield to maturity for each bond based on bond characteristics (coupon rate, coupon frequency, coupon payment dates, bond maturity date) and bond trading prices on days when a bond is traded. We then deduct the duration-matched Treasury bond yield from the yield to maturity to obtain the daily bond yield spread. We take the end-of-month values for monthly yield spreads if a bond is traded within the last ten days of a particular month. Next, we construct monthly corporate bond returns following Bai, Bali, and Wen (2019). Last, we aggregate the bond-level yield spreads and returns to the firm level by taking the average across bonds in the long-term maturity niche, weighted by the outstanding bond amount. We call the first pricing variable the *long-term yield spread* and the second variable the *long-term bond return*.

Our main explanatory variable is *lender preference*. It is constructed at the firm level and is defined as the total lendable amount of firm *i*'s long-term corporate bonds scaled by this firm's total outstanding amount of long-term bonds (*long-term bond lendable-Firm*). The intuition behind this variable is that a higher lendable amount proxies for a higher possibility for lenders to lend out certain types of bonds in exchange for cash collateral. Later sections will also provide robustness checks based on an alternatively constructed lender preference.

C. Control Variables

We consider five sets of control variables that may affect bond issuance and bond pricing. The first set consists of two variables addressing the gap-filling hypothesis advanced in Greenwood, Hanson, and Stein (2010): *long-term Treasury outstanding*, which is the outstanding amount of long-term government bonds scaled by the total outstanding amount of government bonds at the end of each month, and *long-term bond outstanding-Mkt*, which is the outstanding amount of long-term corporate bonds scaled by the total outstanding amount of corporate bonds at the end of each month. They capture how much the long-term maturity niche is saturated by either government bonds or corporate bonds.

The second type of control variable addresses the potential effect posited by the preferred habitat hypothesis. The literature has argued for a long time that investors prefer a specific maturity niche (e.g., Schaefer, 1982). The outstanding amount of existing bonds in a specific maturity niche proxies for the decision of the firm to fill the niche. To control for the preferred habitat effect, we construct the firm-level variable *long-term bond outstanding-Firm,* which is firm *i*'s outstanding amount of long-term bonds scaled by the firm's total outstanding amount of all bonds at the end of each month.

The third control variable is linked to the equity market and, in particular, to the existence of information efficiency in the equity market. It has been shown that short-selling increases liquidity and makes the market more informationally efficient (e.g., Saffi and Sigurdsson, 2011). We define the variable *equity lendable* as the total amount of firm *i*'s stocks available for lending in the equity lending market scaled by the firm's market capitalization at the end of each month. This variable captures the degree of efficiency in the equity market in terms of actual short-selling. It also controls for spurious effects coming from the equity lending market.

Next, we control for bond trading liquidity. The variable *long-term bond liquidity* captures the relative liquidity advantage of the specific maturity niche. It is defined as the average liquidity of long-term corporate bonds scaled by the average liquidity of all bonds in month t issued by the same firm. This indicator of bond-level liquidity is based on the liquidity measure in Amihud and Mendelson (2012) applied to corporate bond transactions.

Last, we consider a set of firm characteristics that potentially affect corporate financing decisions. Given that our focus is on the choice of debt maturity, we want to control for what the literature has identified as potential drivers of corporate debt maturity. These variables include the leverage ratio (*LEV*), the logarithm of the firm's total assets (*SIZE)* to proxy for the pecking order theory, the book-to-market ratio (*B/M*) to proxy for the market timing theory, the return on assets (*ROA*), and Standard & Poor's long-term firm-level rating (*RATING*) to proxy for the effect of credit risk as highlighted by the trade-off theory. We also add the ratio of cash and tangible assets to the firm's total assets (*TAN*) to proxy for transparency and the collateral value of assets, and the dispersion of analyst forecasts for the firm (*DISP*) as an additional proxy for transparency. All variables are calculated from inputs in Compustat at the annual frequency from 2004 to 2013.

D. Summary Statistics

We report the summary statistics of the main and control variables in Table 2. In addition to full-sample descriptions, we also provide summary statistics across subsample periods determined by the NBER business cycle. We find that the average long-term bond issuance is relatively stable across the subsample periods. We also find that bond yield spreads were generally low before the financial crisis (1.542%), jumped up during the crisis of December 2007 to June 2009 (5.007%), and dropped again after the crisis (2.358%). The percentage of long-term bonds outstanding among all bonds outstanding barely changed across subsample periods at either the market level (approximately 35%) or the firm level (46%).

The percentage of long-term bonds available for lending scaled by their outstanding amount is about 21% at the firm level, comparable to the 22% lendable share observed in the equity market. Perhaps not surprisingly, lendable shares in both markets increased during the crisis period compared to the pre-crisis period. However, the bond-market variation is much smaller than the equity market, consistent with the notion of potentially different mechanisms applying to bond and equity lending. Finally, both bond and equity lending markets witnessed increases in lendable shares from pre-crisis to post-crisis. But, again, the bond lending market appears more stable (lendable increases from 19% to 21%) than equity lending (lendable increases from 16% to 24%).

II. Diagnostic Analysis on the Lenders' Preference

In the U.S. securities lending market, lenders temporarily remise ownership of a security in exchange for collateral, usually cash, and receive a lending fee. The borrower is entitled to the economic benefits associated with ownership, for example, dividends and coupons, but is under a contractual obligation to make ("manufacture") equivalent payments back to the lender. The securities lending transaction can originate either with borrowers or with lenders. Typically, broker-dealers or custodian banks such as State Street are used as intermediaries in lending transactions. Borrowers in the bond lending market are often hedge funds and brokers, while lenders are institutional investors such as insurance companies and mutual funds. When lenders receive cash collateral, they reinvest it for yield-enhancement or risk-management purposes.

Early studies about the securities lending market typically took the perspective of borrowers (e.g., Duffie, Gârleanu, and Pedersen, 2002).[12] In contrast, practitioners have long recognized the importance of the other side of the bond lending market—lenders and their collateral management (e.g., JP Morgan, 2006). Witnessing the disastrous outcome of AIG during the Great Recession (Peirce, 2014; McDonald and Paulson, 2015), more recent academic literature has also started to explore the economic role played by lenders. For instance, Foley-Fisher, Narajabad, and Verani (2019) show that insurance companies lend corporate bonds to obtain cash collateral and reinvest cash collateral for yield enhancement.

Compared to what we know about short-sellers, our knowledge of and the related empirical evidence on bond lenders remain limited. Hence, to set the stage for our main analysis, we first conduct three diagnostic analyses to provide intuitions regarding the incentives for lenders to prefer over bond maturity.

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[12] Borrowers may need specific securities to bet on a negative view (e.g., Duffie 1996; Keane 2013), to manage inventory (e.g., Faulkner, 2008), to avoid a settlement/delivery failure (e.g., Musto, Nini, and Schwarz, 2018), or to hedge in an arbitrage strategy (e.g., Dive, Hodge, Jones, and Purchase, 2011). In the corporate bond market, borrowing is less motivated by informed short-selling (Asquith, Au, Covert, and Pathak, 2013) but focuses more on alternative considerations related to inventory control, market-making, and regulatory arbitrage (Foley-Fisher, Narajabad, and Verani, 2019).

A. Lender Preference over Bond Maturity

We first sketch how lender preference is potentially related to corporate bond maturity. To achieve this goal, we highlight the intuition of Cohen, Diether, and Malloy (2007). They identify demand and supply shocks from stock-based short-selling by using paired information on prices (fees) and quantities (lending amount). Their idea is that an increase in lending amount together with an increase in lending fees signals a positive demand shock, whereby borrowers want to borrow more stocks for short-selling. In contrast, a simultaneous increase (decrease) in the lending amount (fees) implies a positive supply shock, whereby lenders are willing to lend out more stocks at a lower price.

We apply this intuition to understand lender preference in the cross-section of corporate bonds. Consider the case in which compared to bond B, bond A is associated with a higher supply of lendable shares and lower fees. Other things being equal, bond A is associated with a higher lending incentive, that is, a higher *lender preference*, because lenders are willing to lend out more shares of A at a lower price. Following this intuition, we can infer lenders' potential preference over bond maturity by analyzing the cross-sectional distribution of bond maturity associated with lendable shares and fees.

We therefore sort corporate bonds in the lending market into five quintiles according to their lendable amounts (scaled by bond outstanding) or their lending fees, and we report the associated distribution of bond maturity in Table 3. We find that the bonds with the highest lendable amount (in Panel A) and the lowest lending fees (in Panel B) tend to have a median remaining time to maturity of approximately seven years, specifically 7.96 and 6.59 years, respectively. In addition, maturity monotonically increases with the lendable amount (Panel A) and decreases with lending fees (Panel B). These patterns suggest that bond lenders are willing to lend out bonds with longer maturity at a lower price.[13] In other words, lenders, on average, have a preference for lending out long-term bonds.

To further control the potential influence of bond characteristics, we expand the above univariate illustration to a more formal multivariate analysis of how lending supply varies across bonds. More explicitly, Panel C reports the determinants of bond lending activities related to the fraction of lendable shares, the fraction of lending shares (i.e., bonds on loan),

[13] Table 1 reports that, consistent with these patterns, bonds with negative lending fees have an even longer maturity.

and lending fees. Several interesting observations emerge. First, lending activities are indeed strongly influenced by bond characteristics. Hence, it is important to control for bond characteristics in understanding the cross-section of lending activities. Second, insurance companies and mutual funds play an important role in the lending market. Indeed, the positive (negative) relationship between their holdings and lendable/lending shares (lending fees) suggests that these institutional investors may actively supply lendable shares and, at the same time, be willing to accept lower lending fees. Our later tests will further exploit this property. Finally, bond maturity is positively related to lendable/lending shares and negatively related to lending fees even after controlling for all other bond characteristics. Hence, our multivariate analysis supports the previous univariate observation that lenders are willing to lend out bonds with longer maturity at a lower price.

The observation that lenders have differential preferences over bond maturities is heuristic. On the one hand, it confirms the importance of maturity in securities lending and collateral management. On the other hand, it provides a benchmark to sharpen the empirical design of our test. Recall that our main goal is to examine how fluctuations in lender preference influence firm behavior. Since lenders prefer bonds with a remaining maturity of seven years or longer, our task becomes whether variations in this preference could subsequently influence firm behavior in issuing bonds with a similar maturity.

B. Yield-enhancement Incentives of the Dual Investor-lender

As exhibited in the case of AIG and noted by Foley-Fisher, Narajabad, and Verani (2019), insurance companies often lend corporate bonds for yield-enhancement purposes in collateral management. The practitioner view (JP Morgan, 2006) further suggests that such an incentive and practice is widespread among other types of bond investors. Suppose collateral management indeed allows bond investors to enhance yield. In that case, we should expect a direct link between the yield-enhancement incentive of bond investors and their willingness to participate in the lending market as lenders. Our second diagnostic analysis aims to explore this potential link for insurance companies and mutual funds, the two most important types of dual lender-investors of corporate bonds.

To achieve this goal, we leverage the intuition that holding bonds with RFY properties reflects the yield-enhancement incentive of financial intermediaries (e.g., Becker and Ivashina, 2015; Choi and Kronlund, 2017). Accordingly, we examine whether bond investors with higher RFY holdings participate more actively in the bond lending market. Empirically, following Choi and Kronlund (2017), we first define the bond-level RFY as the deviation of each bond's yield from the average yield of bonds in the same credit rating category. At the end of each holding quarter, we then calculate the investor-level RFY as the holding-weighted bond-level RFY across all bond holdings by each investor. Our investor sample includes insurance companies and mutual funds, known in the literature to have RFY incentives. We identify a bond investor as a high-RFY investor if its holding-weighted RFY is in the top quintile. For any particular bond, we can then use its ownership by high-RFY investors to proxy for the bond-level yield-enhancement incentive of investors.

Next, we use the lendable amount of a bond (scaled by its outstanding amount and calculated as the average of daily values within a quarter) as the main proxy for the willingness of lender-investors to participate in the bond lending market. We also supplement this measure with two additional variables: lending amount, which is scaled by its outstanding amount and calculated as the average of daily values within a quarter, and the average monthly number of lending transactions within a quarter. These additional variables are likely to be influenced by both lenders and borrowers and thus to be noisy in describing lenders' willingness to participate in the bond lending market. Nonetheless, they help us understand the general activeness of a bond in the lending market.

Based on these proxies, we conduct a bond-level analysis at the quarterly frequency in which we link the participation willingness of bond investors to their lagged yield-enhancement incentives. We control for bond characteristics (*SIZE, LEV, B/M, ROA, TAN, DISP,* and *RATING* as well as equity lendable and bond trading liquidity) and include firm and year fixed effects. We cluster the standard errors at the firm and year level. The results are reported in Table 4.

Panel A confirms a positive bond-level relationship between the yield-enhancement incentive of bond investors and their willingness to participate in the lending market as lenders. In particular, a one standard deviation increase in a bond's holdings by high-RFY investors is related to a 4.80 bps increase in lendable shares in the next quarter. Compared to the average value of lendable (24 bps), this economic magnitude is sizable—it amounts to approximately 20% of the mean value. Likewise, realized lending activities are also increasing in ownership by high-RFY investors. A one standard deviation increase in a bond's holdings by high-RFY investors is related to a 0.68 bp increase in the lending amount (for reference, the average lending share is 2.12 bps) and a 29.50 increase in the number of lending transactions. Both of these effects are statistically and economically significant.

Panel B presents the results at the firm level with a tilt in the long-term maturity niche. We aggregate bonds' holdings by high-RFY investors within a firm according to bond maturity and construct the variable *LT RFY_Holding* to proxy for the incentive to achieve yield enhancement via *long-term* bonds. We then examine whether this new variable can predict the willingness of bond investors to supply long-term bonds in the lending market. Panel B confirms a positive relationship. A one standard deviation higher level of long-term RFY ownership is related to a 10 bps higher future long-term lendable amount, which amounts to approximately 10% of the mean value.

These observations suggest that the yield-enhancement incentive of bond investors is positively related to their willingness to participate as lenders in the lending market. Note that our first diagnostic test indicates that long-maturity bonds are associated with lower lending fees (including negative fees). As a result, it is unlikely that high-RFY investors lend out these bonds merely to receive low and even negative lending fees. Instead, these investors are more likely to lend out such bonds to benefit from collateral management.[14]

C. The Lending Activities of Insurance Companies

Thus far, our diagnostic analyses infer lenders' preferences from bond-level observations such as lendable amount and lending fees and the implication of RFY. Ideally, we also want to complement these analyses by providing evidence of lender-level activities. A general analysis of the latter is challenging due to the lack of data—i.e., lenders typically do not reveal how they lend out securities. Nonetheless, we can sketch the economic picture based on the subsample of investors who disclose their lending activities. More explicitly, we exploit the 2010 NAIC regulation that required insurance companies to disclose their engagement in the securities lending market. As a result, we can directly observe how

[14] Investors can also use the repo market to obtain short-term financing from high-rated corporate bonds. However, for collateral management purposes, the securities lending market is more convenient for the lending contracts' longer durations and the amount of cash collateral that can be received. For example, lenders can receive cash collateral that amounts to 102% of the value of the securities on loan (Duffie, Gârleanu, and Pedersen, 2002). In contrast, the repo market typically offers short-term financing below the value of securities (e.g., 95% for AAA corporate bonds with 5-10 years of maturity as of July 1, 2019, according to the Federal Reserve Discount Window Margins and Collateral Guidelines).

insurance companies lend out securities in the post-regulation period. Section IV will provide more discussions on this regulation and its implications.

We accordingly conduct the third diagnostic analysis to investigate two properties of insurance companies' observed lending activities. First, insurance companies face regulatory constraints. Since collateral management and its associated off-balance-sheet assets provide a tool to mitigate regulatory restraints, we should expect insurance companies facing more stringent balance-sheet restrictions to have more incentives to exploit this tool. Second, our first diagnostic test implies that collateral management provides an essential motivation for lenders to lend out long-term bonds. If so, we should directly observe such a preference by insurance companies. In brief, the observation of lending activities could allow us to provide direct evidence of the dual lender-investor role played by insurance companies.

To achieve this goal, we examine the bond lending activities for three primary types of insurance companies (life, property & causality, and health) over the sample period of 2011−2015. For each insurance company, we calculate the proportion of corporate bond lending amount in its corporate bond holdings at the end of each year. For the first test, we regress this lending portion variable on its one-year lagged regulatory stringency in balance-sheet restrictions, proxied by a dummy variable *RBS Constraint*. The variable takes the value of one if the risk-based capital (RBC) ratio in the previous year is less than 200%—and zero otherwise. According to NAIC's regulation rule, an insurance company must submit a plan for how capital will be increased or risk reduced in order to increase the RBC ratio once the ratio falls below 200%.[15]

The results are tabulated in Models (1) and (3) in Table 5. We also include the year fixed effect with standard errors clustered at the insurance company level. The difference between Models (1) and (3) is that we measure the lending proportion based on a bond's book-adjusted carrying value (BACV) in the former model and its fair value (FV) in the latter.

[15] There are four levels of RBC actions. Once the ratio falls below 200%, insurance companies need to take action. If the ratio is lower than 200% but higher than 150%, companies must submit plans to boost the ratio; if the ratio is lower than 150% but higher than 100%, the regulator has the discretion to take action against the company (for example, could restrict new business); if the ratio is lower than 100% but higher than 70%, the regulator is authorized to take control of the company, but not required to; if the ratio is lower than 70%, the regulator is required to liquidate or rehabilitate the company. For a robustness check, we also use the threshold of 150% to determine an insurance company's constraint status. The sample of constrained companies is much smaller though the results (untabulated) remain the same with less statistical significance.

Regardless of how we calculate the bond value, we find that more constrained companies based on risk-based capital participate more in the securities lending market.

To conduct the second test, for each insurance company's holding portfolio, we calculate its value-weighted (e.g., based on NAIC designations) time-to-maturities of corporate bonds. To investigate the lending-maturity relation, we then regress the lending portion of corporate bonds on not only *RBS Constraint* but also VW time-to-maturities. In addition, we also control for the VW ratings of bonds, the VW coupon rates of corporate bonds, as well as a list of other variables that are important to describe the operation of an insurance company: leverage (the ratio of total liabilities to total assets), total assets, the proportion of corporate bonds in the total holding securities, and the turnover ratio of corporate bond holdings. All independent variables are one year lagged. We also include the year fixed effect with standard errors clustered at the insurance company level.

Models (2) and (4) report the results, where the lending proportion is based on BACV and FV, respectively. First, we can see that bond maturity is positively related to the lending portion. In other words, insurance companies holding longer-maturity corporate bonds tend to lend out more of their holdings. This observation is consistent with a general preference to lend out long-term bonds. Next, the significance of *RBS constraint* gets reduced in the presence of maturity. This result is not surprising: more constrained insurance companies should buy more long-term bonds to participate better in the lending market. Hence, the maturity effect partly captures the incentives of using collateral management to mitigate regulatory restrictions. In contrast, other portfolio and bond characteristics do not significantly affect lending activities. All these effects highlight the importance of bond maturity in lenders' preferences.

Collectively, the evidence in this section suggests that bond investors prefer lending out bonds with longer maturity due to the yield-enhancement goal of collateral management. As a result, changes in the benefits of collateral management may introduce variations in lenders' maturity preference. Armed with these results, we can now investigate how such variations in lender preference affect corporate financing policies.

III. Baseline Analysis of Lender Preference and Corporate Financing Policies

In this section, we first examine the extent to which variations in lender preference may affect the corporate decision on the maturity niche of bond issuance. We then explore whether this effect is achieved through the channel of enhanced bond prices.

A. Lender Preference and Bond Issuance

Following Greenwood, Hanson, and Stein (2010), we regress *long-term bond issuance* on lender preference and a set of control variables. As discussed in Section II, we consider two proxies for lender preference: the firm-level lender preference, measured by *long-term bond lendable-Firm*, and the aggregate market-level lender preference, measured by *long-term bond lendable-Mkt*. The control variables include (i) market-level variables such as *long-term Treasury outstanding* and *long-term bond outstanding-Mkt*; (ii) firm-level variables such as *long-term bond outstanding-Firm* and *equity lendable*; (iii) bond trading liquidity, measured by *long-term bond liquidity*; and (iv) firm characteristics such as *SIZE, LEV, B/M, ROA, TAN, DISP*, and *RATING.* We test the predictive power of lender preference for a firm's bond issuance decision in the following year. Thus, the independent variables take the end-of-year value and lag the dependent variable by one year.

Table 6 reports the results in panel specifications. Using such linear models has particular merit when the dependent variable is binary, that is, we do not need to rely on the numerical convergence of the estimation, which tends to be problematic with multidimensional fixed effects (Beck, 2018). We first test the firm-level lender preference in Model (1), controlling for firm-level characteristics and including the firm fixed effect and the rating-by-year fixed effect to absorb differences in firm characteristics, particularly, firm credit qualities that potentially influence the decision of bond issuance. To examine whether the lender preference means that dual lender-investors lend out existing bonds in their holding portfolios in proportion, we further include in Model (2) the fraction of long-term bonds held by insurance companies, mutual funds, and pension funds. Finally, in Model (3), we drop the rating-by-year fixed effect but add *RATING* back to the control variables as a robust check. In all regression specifications, standard errors are clustered at the firm level.

Across all specifications, we consistently find a strong positive relationship between the dummy variable of long-term bond issuance and the firm-level lender preference. The effect is also economically relevant: a one standard deviation increase in *long-term bond lendable-Firm* elevates the probability of issuing long-term bonds in the next year by 2.23%~2.77%.

Given that the average odds of long-term bond issuance per year is approximately 14.3%, the firm-level lender preference plays a noticeable role in driving the future bond issuance decision.

Among the control variables, we observe that *long-term bond outstanding-Firm* has negative predictive power for long-term bond issuance in the next year. Hence, the more a firm fills this specific maturity niche, the less incentive it has to issue similar bonds again. Also, we observe that firms with higher leverage and larger book-to-market ratios tend not to issue a long-term bond in the next year; firms with higher credit risk also tend not to issue long-term bonds in the future. With the inclusion of the firm fixed effect, none of the other control variables exhibits a highly significant influence across all specifications.

We also observe that controlling for long-term bond ownership by institutional investors does not affect our results. Indeed, long-term bond ownership does not have a significant influence in the presence of lending preference and firm characteristics. Hence, the relation between bond issuance and lender preference is unlikely an artifact of passive investors lending out bonds in proportion to their holding values. Instead, lender-investors appear active in lending out bonds, presumably due to the time-varying benefits of collateral management.

B. Lender Preference and Bond Pricing

We now explore bond pricing as a potential mechanism to guide firm policies. If dual lender-investors of bonds make investment in the bond market conditioning on their lending preference, the high willingness to lend out certain types of bonds should spill over to the cash bond market in the form of a purchasing demand that drives up bond prices and drives down the expected bond return. This impact, if it exists, can help explain why firms have incentives to issue similar bonds since they can benefit from the lower cost of capital as implied by the higher bond price and lower expected return. In this section, we investigate this mechanism by linking lender preference to bond yield spreads and bond returns.

We first measure bond price changes by the value-weighted one-month-ahead yield spreads. More specifically, the monthly firm-level yield spread of long-term bonds is constructed as the average monthly yield spread across long-term bonds for a particular firm in month *t*, weighted by the outstanding amount of each bond. The bond-level monthly yield spread is the average of its daily values calculated from bond transaction prices netting out the corresponding yield of Treasury bonds with the same duration. We then regress the yield spreads of long-term bonds on lender preference and a set of control variables. All explanatory variables take the end-of-month value and are one month lagged from the dependent variable. Accounting variables are based on their end-of-previous-year values.

Table 7 reports the results. We observe a strong and statistically significant negative relationship between long-term bond yield spreads and lender preference. In Model (1), a one standard deviation increase in *long-term bond lendable-Firm* reduces future long-term bond yield spreads by 0.29%. Model (2) illustrates that adding a set of firm-level control variables does not change this effect. When we further include institutional investors' ownership in Model (3), the corresponding impact becomes 0.30%. Given that the average bond yield spread is approximately 2.50%, the impact of bond lenders' preference on future bond yield spreads is economically significant. Hence, lender preference can significantly enhance future bond prices.

Among the control variables, the corporate proxy for gap filling, *long-term bond outstanding-Mkt*, exhibits a significant impact on yield spread when we control for other firm characteristics and bond ownership. More importantly, equity short-selling also has a marginally significant impact in the joint model. However, its direction is the opposite of bond lending: equity short-selling is positively related to future yield spread and thus negatively predicts bond price. This observed difference confirms the economic disparity between bond lending and equity lending. Equity short-selling is motivated by information (as it predicts price drops), whereas bond lending effectively spills over to the cash bond market and drives demand (pushing up the bond price). The firm characteristics such as leverage, book-to-market ratio, return on assets, tangible assets, and the dispersion of analyst opinions have the expected signs in their influence on bond yield spreads: firms with higher leverage, larger book-to-market ratio, lower return on assets, higher tangible assets, and less transparency (more dispersion of analyst opinions) tend to have a higher cost of capital.

We also consider an alternative measure of bond pricing, expected corporate bond return, which is particularly useful in measuring firms' financing costs (Gebhardt, Hvidkjaer, and Swaminathan, 2005). For any particular firm, we measure the expected return of its long-term bonds as the one-month-ahead value-weighted returns of its long-term bonds. We then regress this variable on lender preference and a set of control variables. We report the new results in Table 8.

The baseline message is similar to what we derive from Table 7. Specifically, we find a strong negative relationship between expected returns of long-term bonds and lender preference for these bonds. For example, in the firm-level panel regression (Model (1)), a one standard deviation increase in *long-term bond lendable-Firm* leads to 0.39% lower expected bond returns, which is both statistically significant and economically comparable to the yield impact.

Together, these results confirm that lender preference can influence firm policies via bond prices. In this mechanism, a positive change in lender preference transforms into a lower cost of debt for firms, which in turn motivates them to issue more bonds in the related maturity niche. Importantly, the influence of bond lending on bond prices is the opposite of equity lending, confirming that the mechanism that we propose differs from the known channel of informed short-selling through which the equity lending market can affect firm policies.

IV. The 2010 NAIC Regulation and Related Endogeneity Tests

Thus far, our results suggest that the lending incentives of bond lender-investors may affect firms' financing policies. Although we show that this mechanism differs from the informed short-selling channel, concerns remain that omitted variables may affect both lender preference and firm policies. To alleviate this concern, we exploit a regulatory shock that exogenously affected—and affected only—the willingness of insurance companies to participate in the bond lending market.

A. Impact of the NAIC Regulation on Securities Lending

In the bond market, one reason for the popularity of collateral management is that financial intermediaries can reinvest cash collateral in other securities as *off-balance-sheet* transactions. Since disclosure requests and regulations on the off-balance-sheet transactions are less demanding than those on the on-balance-sheet ones, many financial intermediaries employ collateral management as a tool to relax their regulatory constraints. Reinvesting cash collateral in toxic securities by AIG during the subprime crisis offers an extreme example of such practice.

In 2010, however, the National Association of Insurance Commissioners (NAIC) required insurance companies to disclose their engagement in the securities lending market as a remedy for this regulatory loophole. According to the new regulation, insurance companies must report information on both their securities lending and reinvestment of the lending proceeds. The impact of the regulation has been severe, effectively reducing the participation of insurance companies in the securities lending market. According to an NAIC report, the amount of lending by insurance companies decreased significantly from 2008 to 2011.[16] The reduced participation may have been due to the reduced use of collateral management for relaxing regulatory constraints, to the increased costs associated with additional disclosure (e.g., Goldstein and Yang 2019), or to the reputation risk posed by being publicly associated with borrowers blamed for depressing security prices. Regardless of the underlying reasons, the regulation introduced an exogenous disruption in the participation of insurance companies in securities lending and hence their related lender preference. Below, we examine how this exogenous change in lender preference affected firm policies.

B. Instrumental Variable Regression

To exploit this regulatory shock, we first create a regulation dummy that takes the value of one from 2011 after the regulation that requires insurance companies to release their lending information, and zero before 2010. We then measure the impact of the policy on lender preference by interacting firm-level long-term bond holding by insurance companies (scaled by these bonds' total outstanding amount) and the regulation dummy. Although the pre-regulation holding variable is endogenous, its interaction with the regulation dummy, which takes the value of one for the post-regulation period, provides a reasonable instrument to capture the exogenous shock introduced by the regulation that negatively affected the supply of lendable shares in the post-policy period. For instance, if the regulation completely wiped out the incentives for insurance firms to participate in the lending market, then high pre-regulation bond holding should translate into a high reduction in lendable shares. In this case, a high reduction in lendable shares would arise exogenously because a larger portion of the bonds (i.e., the holdings of insurance companies) was frozen in the lending market following the regulation. The same intuition holds for the case where the regulation froze only a fraction of insurance companies' bond holdings in the lending market.

Accordingly, we conduct the following two-stage IV analysis. In the first stage, we examine whether the interaction term affects the firm-level lender preference proxy. In the second stage, we revisit the relationship between instrumented lender preference and bond

[16] See the NAIC report on July 8, 2011, http://www.naic.org/capital_markets_archive/110708.htm.

issuance as well as bond prices. We adopt the specification reported in Model (2) of Tables 6, 7, and 8 to examine the second-stage relationship. Since we use the bond holdings of insurance companies to instrument lender preference, we cannot use Model (3) that also controls for the bond ownership.

Panel A of Table 9 presents the results. In the first stage, we observe a negative relationship between the interacted instrument and the firm-level lender preference proxy, *long-term bond lendable-Firm*. This observation confirms the negative impact of the regulation on the lendable supply of bonds. In the second stage, we find that the instrumented lender preference has significant predictive power for future bond issuance and bond prices. A one standard deviation increase in the instrumented lender preference increases the probability of bond issuance in the same maturity niche in the next year by 1.45%. It also reduces the next-month yield spreads and the expected bond return of long-term bonds by 0.33% and 0.20%, respectively.

To further explore the power and the economic interpretation of the above results, we also conduct a placebo test by applying the same instrumental approach to the financial crisis. More explicitly, we treat 2008, the peak year of the financial crisis, as a pseudo-event to interact with insurance companies (pre-crisis) long-term bond holdings. We find that both this interaction in the first stage and the influence of instrumented lender preference on bond prices in the second stage become largely insignificant. Economically speaking, these results suggest that the financial crisis does not disincentivize insurance companies in supplying lendable bonds from their holdings.[17] As a result, its economic role and potential influence also differ from the NAIC regulation or the mechanism examined in our current analysis. In the interest of space, we do not tabulate these insignificant coefficients. Above all, the placebo test suggests that our IV test has the proper power to reject economic resources unrelated to the disruption of insurance companies' incentives in participating in securities lending.

As revealed in the above IV test, a critical implication of the 2010 NAIC regulation is that the policy significantly reduces the benefits for insurance companies to participate in the secured lending market. That is, conditioning on long-term bond holdings, the regulatory

[17] This observation is reasonable because lendable shares actually increase during the crisis period, as revealed in our summary statistics in Table 2.

shock reduces insurance companies' incentives to lend out existing bonds in the intensive margin. The changes in lending benefits and thus lending incentives are plausible exogenous to insurance companies and hence provide a reasonable instrument to identify lender-initiated effects. However, the influence of the regulation is not limited to the intensive margin of participation conditioning on existing holding. The same policy shock may also affect holdings at an extensive margin. Since long-term bonds are now less valuable (in expectation of the declining net benefit in collateral management), insurance companies may also want to reduce their bond holdings in the long run.

To test this effect, we empirically explore how the policy shock affects the long-term bond holdings of insurance companies compared to other institutional investors. More explicitly, we adopt a Diff-in-Diff specification around the regulation. Our treated sample includes insurance companies, and the control sample consists of other types of institutional investors. We then regress the fund-level long-term bond holdings on the interaction between the regulation dummy and the indicator for insurance companies. If the regulation affects bond holdings for and only for insurance companies in the extensive margin, we should observe a significantly negative coefficient for the interaction term.

We tabulate the results in Panel B. In Model (1), we control for the size of each investor's portfolio and the regulation dummy. Model (2) uses the time fixed effects to absorb the regulation dummy. Both models include investor-fixed effects, which absorb investors' time-invariant characteristics and the dummy indicator for insurance companies. Empirically, we observe a significant interaction term in both specifications, suggesting that insurance companies reduce their long-term bond holdings after the regulation compared to other types of investors. This result confirms the unique impact of the NAIC regulatory shock on insurance companies, which further endorses the economic importance of securities lending in affecting the decision of insurance companies.

V. Additional Tests

We conduct four additional tests to strengthen our results. We first examine the heuristic cases in which lending fees become negative. Since lending fees reflect the *net* benefit of lending which is the compound influence of rebate rates and direct borrowing costs, negative lending fees indicate that lenders essentially pay borrowers a funding cost in exchange for cash collateral. For example, during the financial crisis of 2007-2008, insurance companies such as AIG relied heavily on the bond lending market to obtain funding, and many such lending transactions had negative lending fees.

Table 10 repeats the analysis as in Tables 6, 7, and 8, assessing the impact of corporate bond lender preference on bond issuance, bond yield spreads, and bond returns in the scenario of negative lending fees. We define the variable *NegFee Ratio* as the ratio of the number of bonds with negative fees to the total number of bonds issued by firm *i* at time *t*. The higher the ratio is, the more lending transactions are conducted with negative lending fees, hence reflecting a higher lender preference. Our main variable of interest is the interaction of lender preference and this ratio. We find that for firms with a higher percentage of transactions with negative lending fees, the predictive power of lender preference for bond issuance and bond prices significantly strengthens. In particular, a one standard deviation increase in lender preference for these firms elevates the probability of long-term bond issuance in the next year by an additional 2.97%, cuts future long-term bond yield spreads by an additional 0.23%, and reduces expected bond returns by an additional 0.20%.

Second, we evaluate whether our results hold for the subsample of nonfinancial firms. All our main results apply to the universe of U.S. public firms. Since most corporate finance studies focus on nonfinancial firms, we repeat our analysis and report the subsample results in Table 11. The panel regression results are quantitatively and qualitatively similar to the previously reported results for the universe of firms, as shown in Tables 6, 7, and 8. Hence, the relationship between bond lending and corporate debt policies can go beyond the financial industry to influence any firms in the real economy.

Third, we consider alternative proxies of lender preference which substitute the *lendable* amount in the original proxy with the *lending* amount. The lending amount is an equilibrium result of both lender preference and borrower preference, whereas the lendable amount is more reflective on the willingness of lenders to lend a specific bond. We find that the alternative measure of lender preference also exerts a significant influence on future bond issuance and future bond prices, as shown in Table 12. Hence, our main results are robust to the use of the alternative proxy.

Lastly, we investigate whether our story in the bond lending market is spuriously related to intrinsic bond characteristics such as covenants. We construct the dependent variable as the difference in corporate bond yield spreads for long-term bonds with and without covenants issued by firm *i* in month *t*. We then regress the difference in yield spreads on our proxy of lender preference and the set of control variables. The results in Table 13 show that lender preference has no significant explanatory power for the difference in yield spreads, regardless of whether a bond has covenants. This result further alleviates concerns over a spurious correlation.

Conclusion

In this paper, we propose and test a novel mechanism through which the bond lending market exerts real impacts on corporate financing policies. Under this mechanism, dual lender-investors of bonds condition their purchases in the bond market on their lending preference. As a result, an increased lender preference for certain types of bonds increases bond prices, incentivizing firms to issue more similar bonds to benefit from a lower cost of capital.

We test this mechanism by exploring the bond maturity niche. Consistent with our working hypotheses, an increase in lender preference for long-term bonds is associated with a higher chance of issuing long-term bonds in the following year, lower future yield spreads, and lower expected returns of long-term bonds. To alleviate the endogeneity concern, we further exploit a regulatory shock introduced by the NAIC in 2010. Our analysis using an instrumental variable specification supports a causal interpretation of our main findings.

Our findings suggest that stock short-selling and bond lending may play fundamentally different roles in our economy, which reflects the disparity in the skills of borrowers and a divergence of the incentives and practices of lenders in the two markets. While many of the known impacts of the stock lending market operate through the common channel of informed short-selling, the new mechanism explored in our paper highlights a different economic basis whereby securities lending can influence the real economy. Our results call for more research to understand the role of lenders in the securities lending market.

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Table 1: **Bond Characteristics in the Lending Market and the Primary Market**

The table presents the number of bonds, the number of firms, and the mean, median, and standard deviation of bond size (in billion dollars), remaining years to maturity, and credit rating. Rating takes numerical values, with AAA=1, AA+=2,... C=21. Investment-grade bonds have ratings from 1 to 10, and speculative-grade bonds have ratings from 11 to 21. The rating is based on Standard & Poor's long-term firm rating. We report the information for corporate bond lending market and corporate bond primary and secondary markets. In the primary market, maturity refers to the number of years between the maturity date and the issue date. The sample period is from January 2005 to December 2014.

			Size ($bil)			Maturity (year)			Rating		
	Bonds	Firms	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Bond lending market	26487	4509	0.47	0.30	0.53	8.96	5.75	10.35	8.78	8.00	4.09
Lending with negative fee	11774	2813	0.64	0.40	0.66	10.02	5.99	10.92	7.17	7.00	3.04
Lending with positive fee	26482	4508	0.45	0.30	0.51	8.87	5.73	10.30	8.91	8.00	4.13
Lendable but not on loan	25456	4509	0.24	0.16	0.31	8.73	5.20	11.07	8.38	8.00	4.18
Bond secondary market	43542	4596	0.53	0.35	0.63	8.71	5.88	8.86	8.63	8.00	4.32
Bond primary market	33918	3244	0.30	0.10	0.51	8.41	7.00	7.87	7.27	6.00	4.41

Table 2: **Summary Statistics of Main Variables**

LT bond issuance is a dummy variable that equals to 1 if firm i issues one or more long-term bonds in a given year. A bond is identified as the long-term bond if it has more than seven years remaining to maturity. *LT yield spread* is the value-weighted end-of-month yield spread across all long-term bonds of firm i, where the bond-level yield spread is the difference of a bond's yield-to-maturity and the duration-matched Treasury bond yield. *LT bond return* is the value-weighted monthly return across all long-term bonds of firm i. *LT bond lendable-Firm* is the total lendable amount of long-term bonds scaled by the total outstanding amount of long-term bonds by firm i at the end of each month. *LT bond lendable-Mkt* is the total lendable amount of long-term bonds across all firms in the sample scaled by these bonds' outstanding amount at the end of each month. *LT bond outstanding-Firm* is the total outstanding amount of long-term bonds by firm i scaled by the total outstanding amount of all bonds by the same firm at the end of each month. *LT bond outstanding-Mkt* is the total outstanding amount of long-term bonds across all firms in the sample scaled by the total outstanding amount of all bonds by those firms at the end of each month. *LT Treasury outstanding* is the total outstanding amount of long-term Treasury bonds scaled by the total outstanding amount of all Treasury bonds at the end of each month. *LT bond liquidity* is the value-weighted liquidity of long-term bonds by firm i scaled by the value-weighted liquidity of all bonds by the same firm at the end of each month, where bond liquidity takes the Amihud (2002) measure. *Equity lendable* is the total lendable amount of equities by firm i scaled by their market capitalization at the end of each month. $DISP$ is the standard deviation of one-year ahead forecast on firm i's earnings across analysts reported in I/B/E/S dataset. $RATING$ is the S&P long-term firm rating which takes numerical values with AAA=1,... C=21. $SIZE$ is the logarithm of total assets (in million dollars). B/M is the ratio of book value to market value. LEV is the leverage ratio defined as the sum of short-term debt and long-term debt divided by these debt value plus the market value of equities. ROA is the return on asset in percentage, defined as the ratio of net income to total asset. TAN is the tangible ratio defined in the way of Almeida and Campello (2007). The sample contains all corporate bonds issued by the U.S. public firms excluding convertible bonds. The sample period is 2005−2014.

Variable	Notation	Whole Sample (Jan2005-Dec2014)		Before Crisis (Jan2005-Nov2007)		During Crisis (Dec2007-Jun2009)		Post Crisis (Jul2009-Dec2014)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
LT bond issuance		0.143	0.350	0.138	0.345	0.137	0.344	0.147	0.354
LT yield spread (%)	$Yield_{i,L}$	2.500	4.480	1.542	3.722	5.007	7.878	2.358	3.211
LT bond return (%)	$Ret_{i,L}$	0.734	4.521	0.432	3.308	0.512	8.898	0.938	3.468
LT bond lendable-Firm	L^{CB}_{iL}/D^{CB}_{iL}	0.207	0.140	0.185	0.161	0.252	0.160	0.208	0.118
LT bond outstanding-Firm	D^{CB}_{iL}/D^{CB}_{i}	0.456	0.222	0.453	0.225	0.456	0.229	0.458	0.218
LT bond outstanding-Mkt	D^{CB}_{L}/D^{CB}	0.351	0.017	0.333	0.008	0.344	0.003	0.362	0.013
LT Treasury outstanding	D^{G}_{L}/D^{G}	0.153	0.034	0.196	0.007	0.177	0.010	0.125	0.012
LT bond liquidity	LIQ_{iL}/LIQ	1.172	0.584	1.145	0.615	1.213	0.579	1.174	0.573
Equity lendable	L^{EQ}_{i}/D^{EQ}_{i}	0.216	0.107	0.160	0.111	0.257	0.114	0.235	0.089
Log of total asset	$SIZE$	8.229	1.916	7.990	1.957	8.146	1.913	8.434	1.861
Book-to-market ratio	B/M	0.528	1.110	0.415	1.049	0.703	1.382	0.560	1.054
Leverage	LEV	0.436	0.333	0.405	0.339	0.507	0.337	0.438	0.323
Return on assets (%)	ROA	0.399	47.35	1.545	31.75	-4.173	74.45	0.921	46.37
Tangibility	TAN	0.436	0.164	0.445	0.162	0.436	0.162	0.430	0.166
Analyst opinion dispersion	DISP	0.180	0.274	0.135	0.227	0.212	0.314	0.201	0.286
SP LT firm rating	$RATING$	10.58	3.696	10.31	3.776	10.73	3.863	10.71	3.585

Table 3: **Lending Activities and Bond Characteristics**

Panels A and B report the median value of bond characteristics for portfolios sorted by lendable amount and lending fee at the end of each month. Panel C shows the results of regressing lending activities on bond characteristics including time-to-maturity (in year), bond size (in billion dollars), rating, coupon rate, a dummy variable for bonds with put options or redeem option. We also consider the aggregate holdings of a specific bond by insurance companies (IC), mutual funds (MF), and other institutional investors such as pension funds. Lendable (lending) amount is defined as the bond-level lendable (lending) amount scaled by bond outstanding amount, expressed in percentage, and lending fee is defined as the transaction-weighted cost for borrowing one dollar of a particular bond based on all open transactions, expressed in basis points and annualized. In Panels A and B, bond trading illiquidity uses the Amihud (2002) measure. The sample period is 2005−2014.

Panel A: Bond portfolios sorted by lendable amount (%)

	Lendable	TTM (yr)	Size ($bil)	Rating	Illiquidity
Low	2.16	4.06	0.250	9	8.82
2	12.47	4.63	0.300	8.5	2.86
3	20.43	5.71	0.350	8.5	3.09
4	28.61	6.75	0.350	8	4.06
High	43.91	7.96	0.250	8	5.32

Panel B: Bond portfolios sorted by lending fee (bps)

	Fee	TTM (yr)	Size ($bil)	Rating	Illiquidity
Low	3.38	6.59	0.500	7.5	3.16
2	7.19	6.38	0.500	8	2.92
3	9.15	6.26	0.450	8.5	3.32
4	10.00	5.75	0.375	9	3.85
High	20.12	5.21	0.350	11	3.47

Panel C: Determinants of bond lending activities

	Lendable (%)			Lending (%)			Fee (bps)		
TTM	0.23***		0.21***	0.04***		0.04***	-0.08***		-0.07***
	(10.98)		(11.12)	(9.54)		(9.75)	(-3.57)		(-3.70)
$SIZE$	0.29		1.15***	-0.31***		-0.13***	-2.70***		-2.94***
	(0.90)		(4.96)	(-4.77)		(-2.60)	(-3.26)		(-3.68)
$RATING$	-1.09***		-0.79***	0.04*		0.10***	4.30***		3.951***
	(-8.45)		(-7.64)	(1.67)		(4.32)	(8.77)		(8.65)
$COUPON$	1.71***		1.22***	0.08***		-0.01	-0.44***		-0.11
	(20.61)		(18.35)	(3.64)		(-0.51)	(-3.13)		(-0.81)
$PRIVATE$	-2.12***		-1.35***	-0.28**		-0.11	-6.85***		-7.27***
	(-5.56)		(-4.57)	(-2.54)		(-1.03)	(-4.71)		(-4.88)
$CALLABLE$	1.07**		0.57	-0.01		-0.12	-2.09**		-1.99**
	(2.21)		(1.42)	(-0.11)		(-0.92)	(-2.38)		(-2.36)
$Holding^{IC}$		0.27***	0.25***		0.05***	0.05***		-0.17***	-0.14***
		(34.22)	(31.26)		(17.18)	(17.08)		(-12.69)	(-11.19)
$Holding^{MF}$		0.18***	0.17***		0.03***	0.03***		-0.06***	-0.07***
		(19.15)	(18.87)		(11.41)	(11.53)		(-2.83)	(-3.54)
$Holding^{OTH}$		0.22***	0.18***		0.01**	0.01*		-0.17***	-0.09***
		(13.49)	(11.12)		(2.46)	(1.71)		(-5.84)	(-3.47)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster	Y	Y	Y	Y	Y	Y	Y	Y	Y
Obs	595971	575674	571315	595971	575674	571315	595971	575674	571315
Adj. R^2	0.488	0.534	0.562	0.281	0.300	0.305	0.270	0.279	0.276

Table 4: **Lending Activities of Bonds held by High Reaching-for-Yield Investors**

The table examines the predictive relationship of bonds ownership by high reaching-for-yield (RFY) investors and these bonds' future activities in the lending market. We consider two lending activities as the dependent variable: the lendable amount and the lending amount of bond-i scaled by its outstanding amount, both are calculated as the average of daily values within quarter-t. Panel A shows the bond-level prediction regression results in the following setup:

$$LendingActivity_{i,j,t+1} = \alpha + \alpha_j + \alpha_t + \beta RFY\_Holding_{i,j,t} + \gamma Z_{j,t} + \varepsilon_{i,j,t+1},$$

where $RFY\_Holding_{i,j,t}$ is the bond-level aggregate holding amounts by its high-RFY investors scaled by a bond's outstanding amount at the end of quarter t. High-RFY investors refer to investors with a rank of 5 which is gauged in the following way. At the end of each quarter, corporate bond investors within insurance companies and mutual funds will be sorted into quintiles by the investor-level RFY, which is the holding-weighted average of bond-level RFY. Investors with the highest RFY holdings have a rank of 5, and those with the lowest RFY holdings have a rank of 1. The bond-level RFY measure is defined as the deviation of each bonds yield from the average yield of bonds in the same credit rating category, as in Choi and Kronlund (2017). Panel B presents the firm-level prediction regression with a tilt in maturity niche:

$$LT\ Activity_{j,t+1} = \alpha + \alpha_j + \alpha_t + \beta\ LT\ RFY\_Holding_{j,t} + \gamma Z_{j,t} + +\varepsilon_{j,t+1},$$

That is,

$$\frac{Activity^{LT}_{j,t+1}}{Activity^{LT}_{j,t+1} + Activity^{ST}_{j,t+1}} = \alpha + \alpha_j + \alpha_t + \beta \frac{RFY\_Holding^{LT}_{j,t}}{RFY\_Holding^{LT}_{j,t} + RFY\_Holding^{ST}_{j,t}} + \gamma Z_{j,t} + +\varepsilon_{j,t+1}.$$

We first aggregate bonds holdings by high RFY investors within a firm according to bond maturity, long-term versus short-term, and then construct the variable $LTRFY\_Holding$ which is the holdings of long-term bonds by high RFY investors scaled by the total holdings of all bonds of the same firm by the same investors. Control variables are defined in Table 2. Standard errors are calculated by clustering at the firm and year level. The sample period is from January 2005 to December 2014.

Panel A: Bond-level prediction regression

	LHS=LT Lendable			LHS=LT Lending		
RFY_Holding	0.309***	0.339***	0.214***	0.044***	0.037***	0.024***
	(21.73)	(16.04)	(11.74)	(12.75)	(8.25)	(6.36)
Equity lendable		15.337***	16.794***		1.750**	2.013**
		(3.93)	(4.52)		(2.19)	(2.50)
LT bond liquidity		-0.094	-0.149		-0.054	-0.060
		(-0.50)	(-0.77)		(-1.24)	(-1.38)
SIZE		-0.720	-0.516		-0.188	-0.182
		(-1.43)	(-1.06)		(-0.97)	(-0.95)
LEV		-13.243***	-10.168***		-0.600	-0.306
		(-3.10)	(-2.86)		(-0.71)	(-0.38)
B/M		-2.195***	-2.209***		-0.078	-0.109
		(-5.49)	(-5.92)		(-0.81)	(-1.17)
ROA		0.088***	0.095***		-0.010	-0.010
		(2.68)	(3.14)		(-1.11)	(-1.03)
TAN		-0.064	-0.063		-0.019	-0.019
		(-1.43)	(-1.54)		(-1.30)	(-1.35)
DISP		-2.612***	-2.384***		0.148	0.219
		(-3.32)	(-2.89)		(1.09)	(1.56)
RATING		-0.025	0.177		-0.020	0.003
		(-0.09)	(0.70)		(-0.30)	(0.04)
Holding by IC			0.191***			0.023***
			(11.11)			(7.14)
Holding by MF			0.118***			0.015***
			(4.60)			(3.66)
Holding by PF			0.240***			0.011*
			(5.02)			(1.72)
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Obs	279830	52488	48463	206172	46809	44321
Adj R^2	0.457	0.397	0.440	0.273	0.193	0.210

Panel B: Firm-level prediction regression with a tilt of maturity niche

	LHS=LT Lendable			LHS=LT Lending		
LT RFY_Holding	0.436***	0.092***	0.090***	0.338***	0.080***	0.070***
	(32.44)	(5.47)	(5.33)	(23.74)	(3.20)	(2.82)
Equity lendable		-0.055	-0.041		-0.080	-0.065
		(-1.09)	(-0.84)		(-0.88)	(-0.71)
LT bond liquidity		-0.010***	-0.010***		-0.005	-0.007
		(-2.68)	(-2.91)		(-0.62)	(-1.07)
SIZE		0.001	0.001		-0.005	-0.010
		(0.08)	(0.09)		(-0.25)	(-0.44)
LEV		0.000	0.035		0.011	0.027
		(0.01)	(0.65)		(0.10)	(0.27)
B/M		-0.003	-0.008		-0.022*	-0.025**
		(-0.45)	(-1.02)		(-1.93)	(-1.98)
ROA		0.001	0.001		0.001	0.001
		(1.05)	(1.19)		(0.60)	(0.67)
TAN		0.000	0.000		0.001	0.001
		(0.71)	(0.59)		(0.46)	(0.63)
DISP		0.023*	0.022**		-0.004	-0.006
		(1.91)	(1.98)		(-0.28)	(-0.39)
RATING		0.001	0.001		-0.017**	-0.015*
		(0.24)	(0.33)		(-2.12)	(-1.93)
LT holding by IC			0.001***			0.001*
			(3.80)			(1.93)
LT holding by MF			0.001***			0.000
			(3.24)			(0.47)
LT holding by PF			0.001			0.001
			(0.74)			(1.20)
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Obs	50967	6837	6626	39662	6752	6542
Adj R^2	0.679	0.430	0.443	0.418	0.280	0.290

Table 5: **Insurance Companies' Financial Constraint and Bond Lending Activities**

This table examines the relationship of insurance companies' financial constraint and their corporate bond lending activities. The dependent variable is the proportion of corporate bond lending amount in the total outstanding amount of corporate bonds held by an insurance company at the end of a given year t. We measure this lending proportion based on a bond's book-adjusted carrying value (BACV) in Models (1)−(2) or its fair value (FV) in Models (3)−(4), both are reported in Schedule D of the Annual Statement by each insurance company. The key explanatory variable is *RBC Constraint* which is equal to one if the risk-based capital (RBC) ratio in the previous year $(t-1)$ is less than 200%, otherwise zero. Here RBC ratio is calculated as the ratio of the total adjusted capital of the company to the required risk-based capital. According to NAIC, an insurance company must submit a plan for how capital will be increased or risk reduced in order to increase the RBC ratio when the ratio is less than 200%. We employ a set of control variables to capture the insurance company's characteristics including the one-year lagged leverage (the ratio of total liabilities to total assets) and the one-year lagged total asset. We also control for insurance companies' holding securities' features including the proportion of corporate bonds in the total holding securities based on BACV, the corporate bond holding turnover ratio (the annual percentage change of total corporate bond holdings based on BACV), the weighted average of holding bonds' ratings based on NAIC designations, the weighted average of holding corporate bonds' coupon rates and their time-to-maturities. We also include the year fixed effect. Standard errors are clustered at the insurance company level. The sample period is 2011−2015. The sample includes three primary types of insurance companies, life, property & causality, and health, which submit annual statements to NAIC. t-statistics are reported in parentheses with the significance of 1%(***), 5%(**), and 10%(*), respectively.

	Bond Lending (BACV)		Bond Lending (FV)	
	(1)	(2)	(3)	(4)
RBC Constraint	4.054***	13.711**	4.059***	13.579*
	(3.83)	(2.00)	(3.89)	(1.96)
Bond Maturity		0.025***		0.026***
		(3.74)		(3.80)
Bond Turnover		0.000		0.000
		(1.14)		(1.32)
Bond Rating		-0.913		-0.946
		(-0.69)		(-0.72)
Bond Coupon		0.541		0.554
		(0.70)		(0.72)
Leverage		-0.229		-0.226
		(-1.44)		(-1.41)
Total Asset		-0.000		-0.000
		(-1.46)		(-1.48)
Proportion of Bonds		-0.024		-0.025
		(-1.00)		(-1.05)
Year FE	Y	Y	Y	Y
Obs	723	580	723	580
Adj R^2	0.002	0.034	0.001	0.035

Table 6: **Lender Preference and Future Bond Issuance**

This table examines the impact of lender preference on future bond issuance. The dependent variable is *LT bond issuance*, a dummy variable that is equal to 1 if firm i issues one or more long-term bonds in year t+1, and 0 otherwise. A bond is identified as the long-term bond if it has more than seven years remaining to maturity. The sample contains all corporate bonds issued by the U.S. public firms excluding convertible bonds. Lender preference is proxied by *LT bond lendable-Firm*, the total lendable amount of long-term bonds scaled by the total outstanding amount of long-term bonds by firm i. Control variables include *LT bond outstanding-Firm*, the total outstanding amount of long-term bonds by firm i scaled by the total outstanding amount of all bonds by the same firm; *Equity lendable*, the total lendable amount of equities by firm i scaled by the market capitalization; *LT bond liquidity*, the value-weighted liquidity of long-term bonds by firm i scaled by the value-weighted liquidity of all bonds by the same firm, where bond liquidity takes the Amihud (2002) measure; *SIZE*, the logarithm of a firm's total asset; *LEV*, the leverage ratio; *B/M*, the book-to-market ratio; *ROA*, return on assets; *TAN*, the tangible ratio defined in Almeida and Campello (2007); *DISP*, the standard deviation of one-year ahead forecast on firm i's earnings across analysts reported in I/B/E/S dataset; and *RATING*, the S&P's long-term firm-level rating. The independent variables take the end-of-year values and lag the dependent variable for one year. Standard errors are clustered at the firm level. The sample period is 2005−2014. t-statistics are reported in parentheses with the significance of 1%(***), 5%(**), and 10%(*), respectively.

Dependent Variable = LT bond issuance [t+1]			
	(1)	(2)	(3)
LT bond lendable-Firm	0.179**	0.186**	0.150*
	(2.11)	(2.12)	(1.95)
LT bond outstanding-Firm	-0.002***	-0.002**	-0.001**
	(-2.59)	(-2.54)	(-2.00)
Equity lendable	-0.220	-0.288	-0.031
	(-0.96)	(-1.24)	(-0.20)
LT bond liquidity	0.038*	0.039*	0.050**
	(1.70)	(1.67)	(2.10)
SIZE	-0.120**	-0.119**	-0.075
	(-2.53)	(-2.49)	(-1.47)
LEV	-0.675***	-0.703***	-0.733***
	(-3.67)	(-3.68)	(-4.04)
B/M	-0.092***	-0.086***	-0.062**
	(-3.70)	(-3.09)	(-2.11)
ROA	0.001	0.001	-0.002
	(0.43)	(0.30)	(-0.79)
TAN	-0.000	-0.000	0.003
	(-0.05)	(-0.07)	(1.11)
DISP	-0.012	-0.007	-0.010
	(-0.29)	(-0.16)	(-0.28)
LT holding by IC		0.000	0.000
		(0.38)	(0.57)
LT holding by MF		-0.001	-0.002*
		(-0.71)	(-1.66)
LT holding by PF		-0.004*	-0.010***
		(-1.77)	(-4.90)
RATING			-0.034**
			(-2.52)
Firm FE	Y	Y	Y
Rating*Year FE	Y	Y	N
Obs	2884	2844	2873
Adj R^2	0.212	0.210	0.114

Table 7: **Lender Preference and Future Bond Yield Spread**

This table examines the impact of lender preference on future bond yield spread. The dependent variable is the value-weighted yield spread across all long-term bonds of firm i in month t+1, where the bond-level yield spread is the difference of a bond's yield-to-maturity and corresponding Treasury bond yield with the same duration. A bond is identified as the long-term bond if the bond has more than seven years remaining to maturity. The sample contains all corporate bonds issued by the U.S. public firms excluding convertible bonds. Lender preference is proxied by *LT bond lendable-Firm*, the total lendable amount of long-term bonds scaled by the total outstanding amount of long-term bonds by firm i. Control variables include *LT bond outstanding-Firm*, the total outstanding amount of long-term bonds by firm i scaled by the total outstanding amount of all bonds by the same firm; *LT Treasury outstanding*, the total outstanding amount of long-term Treasury bonds scaled by the total outstanding amount of all Treasury bonds; *LT bond outstanding-Mkt*, the total outstanding amount of long-term bonds across all firms in the sample scaled by the total outstanding amount of all bonds by these firms; *Equity lendable*, the total lendable amount of equities by firm i scaled by the market capitalization; *LT bond liquidity*, the value-weighted liquidity of long-term bonds by firm i scaled by the value-weighted liquidity of all bonds by the same firm, where bond liquidity takes the Amihud (2002) measure; *SIZE*, the logarithm of a firm's total asset; *LEV*, the leverage ratio; *B/M*, the book-to-market ratio; *ROA*, return on assets; TAN, the tangible ratio defined in Almeida and Campello (2007); and $DISP$, the standard deviation of one-year ahead forecast on firm i's earnings across analysts reported in I/B/E/S dataset.All explanatory variables take the end-of-month value and are one-month lagged from the dependent variable. For firm characteristics, we uses the end-of-previous year value as the value in month t. The sample period is from January 2005 to December 2014. t-statistics are reported in the parentheses with the significance of 1% (***), 5%(**), and 10%(*), respectively.

Dependent variable = LT yield spread, $Yield_{i,L}[t+1]$

	(1)	(2)	(3)
LT bond lendable-Firm	-2.146***	-2.268***	-2.457***
	(-5.42)	(-5.60)	(-5.79)
LT bond outstanding-Firm	0.004*	0.001	0.001
	(1.78)	(0.24)	(0.22)
LT Treasury outstanding	0.013	-0.062	-0.065
	(0.40)	(-1.33)	(-1.36)
LT bond outstanding-Mkt	-0.050	-0.073***	-0.088***
	(-1.64)	(-3.86)	(-4.00)
Equity lendable		0.926	1.137*
		(1.47)	(1.76)
LT bond liquidity		-0.009	-0.012
		(-0.39)	(-0.50)
SIZE		-0.049	-0.014
		(-0.39)	(-0.12)
LEV		1.281***	1.229***
		(2.71)	(2.68)
B/M		0.437***	0.350***
		(3.31)	(2.63)
ROA		-0.021***	-0.022***
		(-3.86)	(-4.07)
TAN		0.010*	0.009*
		(1.85)	(1.70)
DISP		0.418***	0.498***
		(2.94)	(3.72)
LT holding by IC			0.002
			(1.42)
LT holding by MF			0.008***
			(3.16)
LT holding by PF			0.005
			(0.78)
Firm FE	Y	Y	Y
Rating*Year FE	Y	Y	Y
Obs	58224	20898	20294
Adj R^2	0.629	0.640	0.639

Table 8: **Lender Preference and Bond Expected Return**

This table examines the impact of lender preference on future bond return. The dependent variable is the value-weighted return across long-term bonds of firm i in month t+1. A bond is identified as the long-term bond if the bond has more than seven years remaining to maturity. The sample contains all corporate bonds issued by the U.S. public firms excluding convertible bonds. Lender preference is proxied by *LT bond lendable-Firm*, the total lendable amount of long-term bonds scaled by the total outstanding amount of long-term bonds by firm i. Control variables include *LT bond outstanding-Firm*, the total outstanding amount of long-term bonds by firm i scaled by the total outstanding amount of all bonds by the same firm; *LT Treasury outstanding*, the total outstanding amount of long-term Treasury bonds scaled by the total outstanding amount of all Treasury bonds; *LT bond outstanding-Mkt*, the total outstanding amount of long-term bonds across all firms in the sample scaled by the total outstanding amount of all bonds by these firms; *Equity lendable*, the total lendable amount of equities by firm i scaled by the market capitalization; *LT bond liquidity*, the value-weighted liquidity of long-term bonds by firm i scaled by the value-weighted liquidity of all bonds by the same firm, where bond liquidity takes the Amihud (2002) measure; *SIZE*, the logarithm of a firm's total asset; *LEV*, the leverage ratio; *B/M*, the book-to-market ratio; *ROA*, return on assets; TAN, the tangible ratio defined in Almeida and Campello (2007); $DISP$, the standard deviation of one-year ahead forecast on firm i's earnings across analysts reported in I/B/E/S dataset.All explanatory variables take the end-of-month value and are one-month lagged from the dependent variable. For firm characteristics, we uses the end-of-previous year value as the value in month t. The sample period is from January 2005 to December 2014. t-statistics are reported in the parentheses with the significance of 1% (***), 5%(**), and 10%(*), respectively.

Dependent Variable = LT bond return, $Ret_{i,L}[t+1]$

	(1)	(2)	(3)
LT bond lendable-Firm	-3.011***	-3.570***	-3.531***
	(-11.95)	(-8.61)	(-8.08)
LT bond outstanding-Firm	-0.001	-0.001	-0.002
	(-0.69)	(-0.86)	(-1.08)
LT Treasury outstanding	-0.684***	-0.839***	-0.851***
	(-12.30)	(-10.75)	(-10.82)
LT bond outstanding-Mkt	-0.807***	-0.638***	-0.701***
	(-23.04)	(-15.69)	(-16.60)
Equity lendable		-4.856***	-4.617***
		(-6.35)	(-5.86)
LT bond liquidity		-0.002	0.009
		(-0.04)	(0.19)
SIZE		0.219**	0.227**
		(2.36)	(2.37)
LEV		-0.727**	-0.717**
		(-2.05)	(-2.11)
B/M		-0.537***	-0.476***
		(-4.94)	(-5.02)
ROA		0.007	0.009
		(1.19)	(1.49)
TAN		0.008*	0.005
		(1.77)	(1.02)
DISP		-0.007	0.051
		(-0.05)	(0.33)
LT holding by IC			-0.002
			(-1.38)
LT holding by MF			-0.002
			(-0.82)
LT holding by PF			0.023***
			(4.18)
Firm FE	Y	Y	Y
Rating*Year FE	Y	Y	Y
Obs	51346	20685	20085
Adj R^2	0.066	0.062	0.061

Table 9: **Lender Preference and Bond Issuance, Bond Pricing – IV Regressions**

This table applies instrument variable regressions to re-examine the impact of lender preference on future bond issuance, future bond yield spread, and bond expected return. We instrument lender preference by the combination of firm-level long-term bond holding amount by insurance companies scaled by bond outstanding amount, *LT bond holding*, and the intersection of this variable with a regulation event. Here, *Regulation* is a dummy variable which takes value of 1 during 2011-2014, and 0 during 2005-2009, with the event year as $t = 2010$ when NAIC mandates insurance companies to disclose their security lending information. We report the results of IV regressions in Panel A and justify the instrument by examining the long-term bond holding change after the regulation for insurance companies relative to other bond investors such as mutual funds and pension funds in Panel B. The lender preference is proxied by *LT bond lendable-Firm*, the total lendable amount of long-term bonds scaled by total outstanding amount of long-term bonds by firm i. A bond is identified as the long-term bond if the bond has more than seven years remaining to maturity. Control variables in Panel A are the same as in Table 7. In Panel B, the dependent variable is the long-term bond holding amount by investor f during the quarter t. The list of bond investors comes from eMaxx data. The dummy variable IC indicates whether a given investor is an insurance company. *Investor Size* is the log of total holding amount of long-term and short-term bonds by a given investor during a given quarter. The sample period is from January 2005 to December 2014. t-statistics are reported in the parentheses with the significance of 1% (***), 5%(**), and 10%(*), respectively, based on standard errors clustered at the firm level in Panel A and at the fund level in Panel B.

Panel A. IV regressions

	Stage 1	Stage 2		
	LT bond lendable	LT Issuance	LT Yield	LT Return
LT bond holding	0.259***			
	(9.58)			
*LT bond holding * Regulation*	-0.092***			
	(-3.11)			
LT bond lendable-Firm		1.401**	-3.134**	-1.881*
		(2.48)	(-2.32)	(-1.66)
LT bond outstanding-Firm	-0.000**	-0.000	-0.001	-0.001
	(-2.47)	(-0.37)	(-0.44)	(-0.36)
Equity lendable	0.160***	0.305	0.875	-4.400***
	(3.88)	(1.10)	(1.23)	(-6.07)
LT bond liquidity	-0.005***	0.006	-0.026	0.009
	(-3.37)	(0.27)	(-1.06)	(0.22)
SIZE	0.019**	-0.152***	-0.111	0.097
	(2.11)	(-2.94)	(-1.07)	(1.51)
LEV	0.020	-0.576**	1.800***	-1.121**
	(0.49)	(-2.39)	(3.63)	(-2.49)
B/M	-0.016***	-0.037	0.475***	-0.469***
	(-3.58)	(-1.05)	(2.80)	(-3.29)
ROA	0.000	0.002	-0.025***	0.007
	(1.35)	(0.73)	(-4.67)	(1.22)
TAN	-0.001	0.000	0.010*	0.005
	(-1.18)	(0.12)	(1.84)	(0.97)
DISP	-0.010*	-0.049	0.432**	0.094
	(-1.74)	(-0.57)	(2.32)	(0.53)
Firm FE	Y	Y	Y	Y
Rating*Year FE	Y	Y	Y	Y
Observation	20902	1842	20893	20680
Adj. R^2	0.720	0.197	0.616	0.038

Panel B. Long-term bond holding change after Regulation

	(1)	(2)
Regulation* IC	-0.053***	-0.053***
	(-3.61)	(-3.59)
Regulation	0.072***	
	(6.11)	
Investor Size	0.064***	0.063***
	(6.08)	(5.95)
Investor FE	Y	Y
Year FE	N	Y
Obs	293655	293655
Adj R^2	0.833	0.834

Table 10: **Lender Preference in the Extreme Case: Negative Lending Fee**

This table re-examines the impact of lender preference on bond issuance, bond yield spread, and bond return in the scenario of negative lending fee. Lending market demand is proxied by *LT bond lendable-Firm*, the total lendable amount of long-term bonds scaled by total outstanding amount of long-term bonds by firm i. A bond is identified as the long-term bond if the bond has more than seven years remaining to maturity. We also consider the intersection of lending demand with negative lending fee measured by *NegFee Ratio*, which is the ratio of the number of bonds with negative fee to the total number of bonds by firm i at time t. Control variables are the same as in Table 7. The sample period is 2005−2014. t-statistics are reported in the parentheses with the significance of 1% (***), 5%(**), and 10%(*), respectively.

	LT Issuance		LT Yield		LT Return	
	(1)	(2)	(3)	(4)	(5)	(6)
LT bond lendable-Firm	0.148*	0.131	-0.805**	-0.881**	-2.536***	-2.691***
	(1.75)	(1.51)	(-2.01)	(-2.19)	(-6.75)	(-6.97)
*LT bond lending** NegFee	0.383**	0.261	-3.124***	-3.700***	-2.684**	-3.051**
	(2.15)	(1.48)	(-2.90)	(-3.35)	(-2.01)	(-2.24)
NegFee ratio	-0.084	-0.115*	2.870***	3.067***	1.854***	1.976***
	(-1.35)	(-1.83)	(6.39)	(6.65)	(3.54)	(3.71)
LT bond outstanding-Firm	-0.001	-0.001*	0.004	0.003	0.003	0.002
	(-1.26)	(-1.67)	(1.27)	(0.94)	(1.55)	(0.99)
LT Treasury outstanding			-0.042**	-0.024	-0.387***	-0.376***
			(-2.40)	(-1.36)	(-22.48)	(-21.03)
LT bond outstanding-Mkt			-0.039**	-0.037*	-0.648***	-0.634***
			(-2.01)	(-1.68)	(-26.66)	(-22.92)
Equity lendable	-0.033	-0.020	3.391***	3.099***	-3.425***	-3.937***
	(-0.22)	(-0.13)	(4.53)	(4.12)	(-6.10)	(-6.75)
LT bond liquidity	0.041*	0.048**	0.002	0.013	0.007	0.021
	(1.79)	(2.05)	(0.09)	(0.49)	(0.16)	(0.47)
SIZE	-0.094*	-0.052	-0.383***	-0.395***	-0.061	-0.079
	(-1.84)	(-1.09)	(-2.67)	(-2.91)	(-0.85)	(-1.00)
LEV	-0.843***	-0.795***	2.213***	2.130***	-1.056**	-1.125**
	(-4.72)	(-4.44)	(3.83)	(3.78)	(-2.03)	(-2.09)
B/M	-0.069***	-0.078***	0.816***	0.773***	-0.392***	-0.308***
	(-2.63)	(-2.80)	(3.92)	(3.52)	(-2.89)	(-2.67)
ROA	-0.001	-0.001	-0.038***	-0.037***	0.001	0.003
	(-0.46)	(-0.49)	(-5.51)	(-5.44)	(0.16)	(0.45)
TAN	0.003	0.003	0.021***	0.019***	0.010*	0.008
	(1.08)	(1.08)	(3.39)	(3.16)	(1.81)	(1.41)
DISP	-0.040	-0.035	0.633**	0.660**	0.279	0.307
	(-0.98)	(-0.86)	(2.29)	(2.29)	(1.09)	(1.06)
LT holding by IC		0.001		-0.006***		-0.004**
		(1.13)		(-3.78)		(-2.38)
LT holding by MF		-0.002**		0.009***		-0.009***
		(-2.02)		(3.18)		(-3.09)
LT holding by PF		-0.009***		-0.019***		0.007
		(-4.67)		(-2.98)		(1.42)
Firm FE	Y	Y	Y	Y	Y	Y
Rating*Year FE	Y	Y	Y	Y	Y	Y
Obs	2913	2873	20901	20299	20688	20091
Adj R^2	0.096	0.112	0.557	0.559	0.037	0.035

Table 11: **Lender Preference and Bond Issuance, Bond Pricing – Non-Financial Firms**

This table re-examines the impact of lender preference on bond issuance, bond yield spread, and bond return for a subsample of non-financial firms. We repeat the panel regressions in Tables 6, 7, and 8 with the dependent variable as the long-term bond issuance, long-term bond yield spread, and long-term bond return. A bond is identified as the long-term bond if the bond has more than seven years remaining to maturity. The lender preference proxy is *LT bond lendable-Firm*, the total lendable amount of long-term bonds scaled by the total outstanding amount of long-term bonds by firm i. Regression specifications and control variables are the same as in Tables 6, 7, and 8. The sample period is 2005−2014. t-statistics are reported in the parentheses with the significance of 1% (***), 5%(**), and 10%(*), respectively.

	LT Issuance		LT Yield		LT Return	
	(1)	(2)	(3)	(4)	(5)	(6)
LT bond lendable-Firm	0.195**	0.201**	-1.715***	-1.918***	-3.136***	-3.108***
	(2.18)	(2.16)	(-6.69)	(-7.37)	(-8.61)	(-8.17)
LT bond outstanding-Firm	-0.001	-0.001	0.002	0.002	-0.001	-0.001
	(-1.37)	(-1.29)	(0.68)	(0.65)	(-0.73)	(-0.80)
LT Treasury outstanding			-0.087*	-0.092*	-0.726***	-0.739***
			(-1.84)	(-1.92)	(-9.36)	(-9.51)
LT bond outstanding-Mkt			-0.064***	-0.070***	-0.614***	-0.688***
			(-3.57)	(-3.68)	(-14.22)	(-15.00)
Equity lendable	-0.292	-0.331	0.880*	0.983**	-4.434***	-3.927***
	(-1.17)	(-1.31)	(1.96)	(2.22)	(-6.66)	(-5.70)
LT bond liquidity	0.034	0.034	-0.003	-0.005	0.014	0.028
	(1.50)	(1.49)	(-0.11)	(-0.21)	(0.30)	(0.58)
SIZE	-0.145***	-0.145***	0.014	0.036	0.201*	0.205*
	(-3.33)	(-3.34)	(0.12)	(0.30)	(1.87)	(1.85)
LEV	-0.889***	-0.910***	0.707	0.735	-0.557*	-0.706**
	(-4.86)	(-4.86)	(1.52)	(1.62)	(-1.66)	(-2.03)
B/M	-0.108***	-0.103***	0.131	0.114	-0.487***	-0.501***
	(-3.27)	(-3.07)	(0.65)	(0.55)	(-2.98)	(-2.93)
ROA	0.001	0.001	-0.024***	-0.024***	0.006	0.007
	(0.34)	(0.24)	(-4.56)	(-4.52)	(1.02)	(1.14)
TAN	-0.001	-0.001	0.007	0.007	0.008*	0.004
	(-0.39)	(-0.41)	(1.46)	(1.30)	(1.77)	(0.90)
DISP	0.010	0.021	0.360**	0.442***	-0.173	-0.135
	(0.26)	(0.57)	(2.58)	(3.45)	(-1.13)	(-0.67)
LT holding by IC		0.001		0.003**		-0.002
		(0.97)		(2.39)		(-1.13)
LT holding by MF		-0.001		0.008***		-0.001
		(-0.99)		(3.32)		(-0.34)
LT holding by PF		-0.004**		-0.001		0.024***
		(-1.99)		(-0.23)		(4.43)
Firm FE	Y	Y	Y	Y	Y	Y
Rating*Year FE	Y	Y	Y	Y	Y	Y
Observation	2675	2640	18292	17791	18106	17608
Adj. R^2	0.208	0.206	0.685	0.684	0.063	0.063

Table 12: **Alternative Proxy of Lender Preference**

This table re-examines the impact of lender preference on future bond issuance, future bond yield spread, and expected bond return by using a set of alternative proxies for lender preference. Instead of using the lendable variable, we use *LT bond lending-Firm*, the total lending amount of long-term bonds scaled by the total outstanding amount of long-term bonds by firm i. A bond is identified as the long-term bond if the bond has more than seven years remaining to maturity. We repeat the panel regressions in Tables 6, 7, and 8 with the dependent variable as the long-term bond issuance, long-term bond yield spread, and long-term bond return. Regression specifications and control variables are the same as in Table 6, 7, and 8. The sample period is 2005−2014. t-statistics are reported in the parentheses with the significance of 1% (***), 5%(**), and 10%(*), respectively.

	LT Issuance		LT Yield		LT Return	
	(1)	(2)	(3)	(4)	(5)	(6)
LT bond lending-Firm	0.878*	0.918*	-2.911**	-3.285***	-5.210***	-5.147***
	(1.68)	(1.72)	(-2.56)	(-2.70)	(-5.04)	(-4.66)
LT bond outstanding-Firm	-0.002***	-0.002***	0.002	0.002	0.000	-0.000
	(-3.05)	(-2.91)	(0.69)	(0.64)	(0.20)	(-0.15)
LT Treasury outstanding			-0.056	-0.056	-0.838***	-0.849***
			(-1.17)	(-1.16)	(-10.83)	(-10.90)
LT bond outstanding-Mkt			-0.046***	-0.058***	-0.599***	-0.662***
			(-2.64)	(-2.98)	(-15.03)	(-16.15)
Equity lendable	-0.210	-0.269	0.576	0.744	-5.491***	-5.259***
	(-0.92)	(-1.16)	(0.94)	(1.19)	(-6.96)	(-6.49)
LT bond liquidity	0.036	0.036	-0.004	-0.005	0.008	0.019
	(1.61)	(1.55)	(-0.16)	(-0.20)	(0.18)	(0.43)
SIZE	-0.119**	-0.117**	-0.096	-0.066	0.141	0.149
	(-2.46)	(-2.41)	(-0.83)	(-0.59)	(1.55)	(1.59)
LEV	-0.698***	-0.730***	1.150**	1.071**	-0.943***	-0.960***
	(-3.76)	(-3.78)	(2.44)	(2.34)	(-2.74)	(-2.95)
B/M	-0.096***	-0.090***	0.476***	0.400***	-0.472***	-0.400***
	(-3.87)	(-3.26)	(3.59)	(2.97)	(-4.37)	(-4.52)
ROA	0.001	0.001	-0.023***	-0.024***	0.004	0.006
	(0.58)	(0.44)	(-4.04)	(-4.30)	(0.67)	(0.99)
TAN	0.000	-0.000	0.012**	0.011**	0.010**	0.007
	(0.03)	(-0.01)	(2.14)	(2.00)	(2.38)	(1.61)
DISP	-0.014	-0.010	0.452***	0.538***	-0.002	0.053
	(-0.32)	(-0.22)	(3.03)	(3.78)	(-0.01)	(0.32)
LT holding by IC		0.000		0.000		-0.003**
		(0.45)		(0.35)		(-2.30)
LT holding by MF		-0.001		0.005**		-0.005*
		(-0.68)		(2.30)		(-1.88)
LT holding by PF		-0.004*		0.004		0.022***
		(-1.73)		(0.61)		(3.96)
Firm FE	Y	Y	Y	Y	Y	Y
Rating*Year FE	Y	Y	Y	Y	Y	Y
Obs	2849	2808	20830	20228	20623	20025
Adj R^2	0.211	0.209	0.635	0.633	0.057	0.056

Table 13: **Lender Preference and the Yield Difference for Bonds with and without Covenants**

This table examines the impact of lender preference on the difference of corporate bond yield spread for bonds with and without covenants. The dependent variable is the difference of yield spread of long-term bonds with and without covenants by firm i in month t+1. A bond is identified as the long-term bond if the bond has more than seven years remaining to maturity. The sample contains all corporate bonds issued by the U.S. public firms excluding convertible bonds. We consider two proxies of lender preference. The first proxy is *LT bond lendable-Firm*, the total lendable amount of long-term bonds scaled by total outstanding amount of long-term bonds by firm i. Control variables include *LT bond outstanding-Firm*, the total outstanding amount of long-term bonds by firm i scaled by the total outstanding amount of all bonds by the same firm; *LT Treasury outstanding*, the total outstanding amount of long-term Treasury bonds scaled by the total outstanding amount of all Treasury bonds; *LT bond outstanding-Mkt*, the total outstanding amount of long-term bonds across all firms in the sample scaled by the total outstanding amount of all bonds by these firms; *Equity lendable*, the total lendable amount of equities by firm i scaled by the market capitalization; *LT bond liquidity*, the value-weighted liquidity of long-term bonds by firm i scaled by the value-weighted liquidity of all bonds by the same firm, where bond liquidity takes the Amihud (2002) measure; *SIZE*, the logarithm of a firm's total asset; LEV, the leverage ratio; *B/M*, the book-to-market ratio; ROA, return on assets; TAN, the tangible ratio defined in Almeida and Campello (2007); $DISP$, the standard deviation of one-year ahead forecast on firm i's earnings across analysts reported in I/B/E/S dataset. All explanatory variables take the end-of-month value and are one-month lagged from the dependent variable. For firm characteristics, we uses the end-of-previous-year value as the value in month t. The sample period is from January 2005 to December 2014. t-statistics are reported in the parentheses with the significance of 1% (***), 5%(**), and 10%(*), respectively.

Dependent Variable = $\left(\text{Yield}_{iL}^{C} - \text{Yield}_{iL}^{NC}\right)[t+1]$

	(1)	(2)	(3)
LT bond lendable-Firm	0.728	-0.933	-1.280
	(0.81)	(-0.52)	(-0.70)
LT bond outstanding-Firm	0.019*	0.027*	0.027*
	(1.96)	(1.74)	(1.69)
LT Treasury outstanding	-0.058	-0.031	-0.027
	(-0.58)	(-0.35)	(-0.29)
LT bond outstanding-Mkt	0.065	-0.034	-0.035
	(1.60)	(-0.63)	(-0.65)
Equity lendable		-2.418**	-2.341**
		(-2.05)	(-2.10)
LT bond liquidity		-0.045	-0.048
		(-0.60)	(-0.68)
SIZE		0.884***	0.981***
		(2.97)	(3.37)
LEV		-0.891	-1.002
		(-0.41)	(-0.48)
B/M		-0.141	-0.117
		(-0.74)	(-0.58)
ROA		-0.031	-0.033
		(-0.74)	(-0.80)
TAN		-0.017	-0.017
		(-0.74)	(-0.76)
DISP		-1.593***	-1.574***
		(-3.53)	(-3.45)
LT holding by IC			0.002
			(0.42)
LT holding by MF			0.017*
			(1.87)
LT holding by PF			-0.024
			(-1.09)
Firm FE	Y	Y	Y
Rating*Year FE	Y	Y	Y
Obs	8329	2676	2611
Adj R^2	0.401	0.684	0.685