Capital Supply and Corporate Bond Issuances: Evidence From Mutual Fund Flows

Qifei Zhu*

Abstract

This paper examines how idiosyncratic shocks to capital supply affect firms' bond issuance decisions. Using bond funds' holdings data, I establish an empirical fact that funds that hold existing bonds of a company have a high propensity to acquire new bonds from the same firm. Capital flows to a firm's existing bondholders hence affect firm-specific capital supply. Companies with higher bondholder flows are more likely to issue bonds, enjoy lower yields, and substitute away from equity financing and bank loans. I support the main results by using Bill Gross' resignation from PIMCO as an exogenous shock to the capital supply of affected companies.

*Nanyang Business School, Nanyang Technological University. qifei.zhu@ntu.edu.sg. This paper is based on my PhD dissertation at the University of Texas at Austin. I am grateful to the members of my dissertation committee, Andres Almazan, Jonathan Cohn, Clemens Sialm (co-Chair) and Laura Starks (co-Chair). I would also like to thank Aydogan Alti, Billy Grieser, Zack Liu, Sheridan Titman, Vijay Yerramilli (discussant), Ben Zhang, and participants at the FIRS Conference and seminars at Baruch College, Nanyang Technological University, National University of Singapore, Singapore Management University, Southern Methodist University, University of New South Wales, University of Melbourne, University of Virginia, and University of Texas at Austin for their insightful suggestions and comments.

How does variation in the supply of different forms of capital affect firms' financing decisions? Traditionally, capital structure studies examine factors relating to firms' demand for debt, such as taxes and distress costs. A burgeoning literature find evidence that the capital structure of a company is significantly affected by the capital availability of its creditors or investors (e.g. Faulkender and Petersen (2006), Leary (2009), Sufi (2009)).[1] These findings suggest a potentially important role for capital supply in determining firms' financing choices.

In this paper, I study how idiosyncratic shocks to investor capital affect firms' decisions to issue bonds. Bond issuance is a major source of external financing for U.S. companies.[2] Unlike bank loans, bond issuance is thought to *not* depend on the capital of specific investors: When a firm's usual capital suppliers have insufficient capital, firms should turn to a broad base of investors for financing. However, among a sample of bond-investing mutual funds, I find significant "stickiness" in bond funds' investment decisions: a firm's current bondholders are much more likely to acquire newly-issued bonds of the same company than investors who do not hold the previous issues. This type of issuance-market segmentation implies that the capital supply of a given firm may be affected by the capital availability of a small number of investors.

Building on this stylized fact, I construct a firm-specific variable, Bondholder Flow ($BHFlow$), to capture shocks to a firm's bond capital supply. $BHFlow$ is defined as the dollar amount of the capital supply from a firm's existing bondholder funds scaled by the firm's outstanding bonds, under the assumption that bond funds proportionally adjust their existing positions to flows. I find that bondholder flow positively predicts the probability of firms' future bond issuance, and negatively predicts bond financing costs in the cross-section. Controlling for time fixed-effects, a one standard

[1] See also the survey evidence from Graham and Harvey (2001) and anecdotal evidence from Titman (2002).

[2] During 1998–2014, U.S. non-financial companies issued USD 4.9 trillion of equity (gross of repurchases and M&A), USD 16.3 trillion of corporate bonds (gross), and obtained USD 5.8 trillion of commercial and industry loans (gross). See Figure 1 for the bond issuance volume in recent years. Source: Federal Reserve Bank; SIFMA

deviation increase in $BHFlow$ predicts a 0.94 percentage point increase in the issuance probability next quarter (14 percent relative to the unconditional likelihood) and a 5.5 basis points decline in offering yield spreads.

These results suggest a significant capital-supply effect on firms' bond issuances. It echos findings in Lemmon and Roberts (2010) and Chernenko and Sunderam (2012) that corporate bond financing responds to market conditions. While the shocks used in these previous papers affect the entire high yield segment relative to the investment grade segment, the capital supply variations in my paper are firm-specific. To make sure that the predictive power of $BHFlow$ is not driven by systematic components in fund flows, I further decompose fund-level flows into an expected component and the residual, following the literature on mutual fund flows (e.g., Sirri and Tufano (1998); Goldstein, Jiang, and Ng (2017)).[3]. Consistent with the baseline results, the residual component predicts both issuance probability (positively) and offering yield spreads (negatively).

I further rule out alternative explanations that demand-side factors drive the observed relation between $BHFlow$ and issuances. First, I find that a stronger bondholder flow predicts a lower probability of future equity issuances and bank loan initiations. This alleviates the concern that bondholder flow covaries with firms' total financing needs, or firms' general demand for debt. Instead, firms seem to actively trade off among various forms of capital (Baker (2009), Ma (2016)). Second, issuers who raise bonds when bondholder flow is high spend a smaller fraction of issuance proceeds in investments, as compared to other bond issuers. This contradicts what one would expect if bondholder flow captures unobserved improvement in firms' investment opportunities.

To further address the endogeneity concern, I utilize an unexpected shock to bond fund flows derived from Bill Gross' resignation from the Pacific Investment

[3]The explanatory variables for fund flow include past fund performances, fund size, fund age, investment objective of a fund, and the expense ratio of a funds.

Management Company (PIMCO). Bill Gross was the founder and CIO of PIMCO and a well recognized fixed-income fund manager. His abrupt resignation from PIMCO (presumably because of internal power struggle)[4] in September of 2014 triggered large redemption from all PIMCO mutual funds. I use this event as a negative capital supply shock for companies who have a significant amount of bonds held in PIMCO's portfolios. In a difference-in-differences setting, I find that PIMCO's portfolio companies become significantly less likely to issue new bonds after Gross' departure, relative to otherwise similar issuers.

The finding that corporate bond issuances are affected by individual bondholders' capital is perhaps surprising when viewed through the lens of bank lending versus arm's-length financing. In bank lending, banks develop close relationships with their borrowers through continuous monitoring (Boot (2000)). While bondholders in general do not monitor their debtors, I hypothesize two economic mechanisms that may create "stickiness" in their investment relationship. First, existing bondholders may have lower information costs when they acquire new bonds: They have conducted due diligence in the past and the information they gathered is "re-usable" (Chan, Greenbaum, and Thakor (1986)). Second, existing bondholders may have repeated relationships with the underwriters of bond issuances. Anecdotal evidence suggests that some investment banks play favorites when allocating new bond issuances.[5]

Consistent with the information costs explanation, the propensity for existing bondholders to participate in new bond offerings over regular investors is increasing in firms' degree of information asymmetry. For example, high-yield bond issuances rely more heavily on the capital contribution of existing bondholders than investment-grade ones do. I also find that high-information-asymmetry companies are more responsive to bondholder flow in making bond issuance decisions. To test the under-

[4] For example, see "Bill Gross, King of Bonds, Abruptly Leaves Mutual Fund Giant PIMCO", *The New York Times*, September 26, 2014

[5] "Regulators Are Probing How Goldman, Citi and Others Divvied Up Bonds", *Wall Street Journal*, Feb. 28, 2014

writer relationship explanation, I classify bond funds as "relationship investors" if a fund has participated in prior bond offerings underwritten by the same investment bank. I find that the status of being a relationship investor only explains a small fraction of the effect of being an existing bondholder when mutual funds participate in new bond offerings.

The findings in this paper contribute to several strands of literature. First, they provide novel evidence for the supply effect on corporate capital structure. Traditional capital structure studies tend to focus on the corporate demand for debt, while taking capital supply as perfectly elastic, an assumption consistent with Modigliani and Miller (1958). Several recent papers challenge this assumption, and they empirically show that the supply of capital affects firms' financing decisions (e.g. Faulkender and Petersen (2006), Leary (2009), Sufi (2009), Lemmon and Roberts (2010)). A common challenge for this nascent literature is to distinguish the supply effect from the contamination of firms' debt demand. To meet this identification challenge, Leary (2009), Sufi (2009) and Lemmon and Roberts (2010) establish causality by utilizing plausibly exogenous one-time shocks on the capital supply of specific market segments. My paper uses a measure ($BHFlow$) that is firm-specific and applicable to all bond-issuing firms. This allows comparisons within large cross-sections.

My paper also relates to the the literature on how equity issuance responds to equity valuation.[6] Khan, Kogan, and Serafeim (2012) show that the probability of SEO increases when mutual fund shareholders receive large inflows. Gao and Lou (2013) document that firms switch to debt financing when their equity prices are temporarily depressed by mutual fund fire sales.[7] Compared to equity issuances, bond issuances are more frequent, and they constitute a larger amount of corporate external financing. More importantly, the lack of liquidity in the secondary corporate

[6]For example, see Baker and Wurgler (2002); Baker, Stein, and Wurgler (2003); and Alti and Sulaeman (2012) for equity SEOs, and Alti (2006) for IPOs.

[7]Also related is Edmans, Goldstein, and Jiang (2012)), who show that undervaluation induced by mutual fund fire sales increases takeover probability.

bond market (Edwards, Harris, and Piwowar (2007); Bao, Pan, and Wang (2011)) amplifies the impact of bondholder flows. The low liquidity makes it costly for funds to accommodate their flows via secondary-market trading. As a result, companies are in a unique position to meet their investors' increased flow-driven demand by issuing new bonds. Empirically, I findt that firms whose outstanding bonds are less frequently traded are particularly sensitive to bondholder flows when making bond-issuance decisions.

Other types of investors in the bond market, notably insurance companies, can also affect prices and quantities of corporate bonds. For example, Ellul, Jotikasthira, and Lundblad (2011) show that regulatory constraints on insurance companies create selling pressure when a bond is downgraded from an investment-grade rating to a high-yield rating.[8] A key distinction here is that mutual funds are funded on redeemable shares that can be requested by investors in short notice, while insurance companies are funded by long-term policies (Koijen and Yogo (2015)). Hence the bond capital supply from mutual funds is likely to be more variable and uncertain for issuers than the supply from insurance companies (Massa, Yasuda, and Zhang (2013)).

Finally, this paper contributes to the current debate on the role of mutual funds in the corporate bond market.[9] Many concern that the liquidity mismatch between mutual funds and their less liquid underlying assets (Bessembinder, Jacobsen, Maxwell, and Venkataraman (2017)) create fragility in the corporate bond market in times of large mutual fund redemptions and could threaten financial instability (Feroli, Kashyap, Schoenholtz, and Shin (2014); Zeng (2017)). To date, this debate has primarily focused on the asset pricing implications.[10] Instead, this paper suggests that

[8]Other related studies include Becker and Ivashina (2015); Manconi, Massa, and Zhang (2015); Nanda, Wu, and Zhou (2016)

[9]For example, see "Could bond funds break the market?", *The Economist*, July 20, 2017; "Redemption Risk of Bond Mutual Funds and Dealer Positioning", *Federal Reserve Bank of New York*, October 08, 2015.

[10]For example, Choi and Shin (2016); Chernenko and Sunderam (2016); Cai, Han, Li, and Li (2017); Choi and Kronlund (2017); Jiang, Li, and Wang (2017); Spiegel and Starks (2017)

bond funds (and their flows) can also affect corporate financial policies.

1 Data Sources

Data used in this paper are derived from several sources. The quarterly mutual funds' bond holdings are obtained from the Thomson Lipper eMAXX dataset (formerly Lipper eMAXX). The issuances of new bonds, including information about the issuers, terms of the bonds (e.g. maturity, coupon rate, call option), and offering yields, come from the Thomson SDC database. Mutual fund flows and total net assets (TNA) are obtained from the CRSP Mutual Fund Database.

The Thomson Lipper eMAXX database contains quarterly fixed-income holdings for nearly 20,000 insurance companies, mutual funds, and pension funds, as well as some hedge funds. Each entry in the eMAXX holdings data contains information on the bond (identified by the CUSIP), the holding institution (identified by an internal *Account_id* maintained by Lipper), the type of holding institution (e.g. mutual fund, insurance company), the par amount of the position, and the reporting date.

Information about bond issuances comes from the Thomson SDC database. Each bond issuance contains the identity of the issuer, the offering amount at par value, the offering yield, and other characteristics. The bond-level information is then merged to the mutual fund bond holdings by the CUSIP of the bond. Prior research has shown that Lipper eMAXX has a comprehensive coverage for corporate bond holdings (Dass and Massa (2014)).

To calculate the returns of corporate bonds on the secondary market, I use the reported transaction prices on the Trade Reporting and Compliance Engine (TRACE) database. In order to filter out erroneous reporting from TRACE, I follow the procedure provided by Dick-Nielsen (2009).[11]

[11]Since TRACE starts reporting bond transactions on 1 July 2002, I supplement the bond pricing data using transactions reported by National Association of Insurance Commisioners (NAIC) from

I obtain seasoned equity offering (SEO) data from the Thomson SDC database. For bank loans, the Thomson Reuters DealScan provides comprehensive data coverage on private debt for U.S. companies.I focus on term loans in my analysis and drop revolvers, 364-day facilities, or bridge loans.[12] The firm-level link between DealScan and Compustat is done through the link table provided by Professor Michael Roberts.[13]

2 Bond Funds and Bond Capital Supply

In this section, I document a novel pattern of bond-market segmentation: bond funds are more likely to participate in new bond offerings if they are existing bondholders of the issuer. This observation is crucial for constructing a firm-specific capital supply measure, *bondholder flow* ($BHFlow$). It captures the hypothetical capital supply available to a given firm from its existing bondholders.

2.1 Sample Construction for Bond Mutual Funds

In order to investigate the behavior of institutional bond investors, I focus on mutual funds that specialize in investing in corporate bonds, whose quarterly holdings are available on the eMAXX dataset. I start by keeping all institutions that are categorized as mutual funds in the eMAXX database. I then manually link the *Account_id* to CRSP Mutual Fund database by matching funds by their names. Since I focus on mutual funds that primarily invest in corporate bonds, since flows to such funds are primarily accommodated by changes in buying and selling corporate bonds. Therefore, I require a fund to hold at least 50% of its assets in corporate bonds. This procedure results in 1,211 distinct mutual funds in the sample period between 1998

1998 to June 2002.

[12] As noted by Rauh and Sufi (2010), for low-credit-quality firms that tend to use a mixture of unsecured debt and bank debt, short-term bank debt is not easily replaceable by unsecured debt because the timeliness of short-term bank debt. In contrast, long-term bank loans and public bonds are more likely to be substitutes.

[13] For details on the construction of the data, see Chava and Roberts (2008).

and 2014.

To assess the how representative the eMAXX sample is in relation to corporate bond mutual funds, I compare my sample with several alternative sources. First, I find 1,535 distinct corporate bond funds in the CRSP Mutual Fund database between 1998 and 2014, where I constrain a fund's investment objective to be domestic fixed income.[14] The year-to-year match rate is between 80.4% to 94.6%.[15] Second, the total value of corporate bond holdings by my sample mutual funds account for roughly 65% of what is disclosed as "Corporate and Foreign Bonds" held by mutual funds, according to the Financial Account of the United States, published by the Federal Reserve Board.[16]

2.2 Investment Behavior of Mutual Funds

How do bond mutual funds make investment decision when acquiring new bonds at offerings? In this section, I uncover a persistent investment relationship between bond funds and bond issuers. When a firm offers new bond issues in the primary market, existing bondholders of the issuer are much more likely to contribute capital than investors who do not have the firm's outstanding bonds in their portfolios. This novel empirical finding implies segmentation in the new-issue market.

The inclination for existing bondholders to provide capital manifests on both the extensive and intensive margin. On the extensive margin, a mutual fund is more likely to participate in a bond issuance if it is an existing bondholder. On the intensive margin, existing bondholders tend to acquire a larger fraction of the new issues conditional on participating. To show the former result, I examine the probability of

[14] I require a fund to have Lipper Objective Code of "A", "BBB", "HY", "SII", "SID", or "IID". I then exclude funds whose name suggests that it invests in foreign fixed income assets, municipal bonds, or government bonds.

[15] The exact match rate can be found in the Internet Appendix.

[16] *Financial Account of the United States*, Federal Reserve Board of Governors, https://www.federalreserve.gov/releases/z1/

mutual fund j participates in bond issuance i at quarter t:[17]

$$D(Participation_{i,j,t}) = \alpha_{i,t} + \alpha_{j,t} + \beta D(Bondholder_{i,j,t-1}) + \epsilon_{i,j,t} \tag{1}$$

Each observation represents a pair of a bond issuance and a mutual fund that exists in the offering quarter.[18] For each new corporate bond issuance in the sample, dummy variable $D(Participation)$ is set to one for a issue-fund pair if the fund holds the issue at the end of the offering quarter. The key explanatory variable is $D(Bondholder)$, which indicates that a fund is an existing bondholder of the issuer. The characteristics of bond issuances and the characteristics of issuers are subsumed by issuance fixed-effects and fund-by-quarter fixed-effects. To accommodate for these fixed-effects, I primarily rely on linear probability models.

Panel A of Table 1 shows the regression results for the new-issuance participation. To fix the idea for the economic magnitude, a fund with no prior ownership in the issuer's existing bond has a probability of 2.6 percentage points in investing in a given bond issuance. Column (1) shows that being an existing bondholder increases the probability of acquiring additional new issues from the same issuer by 12.8 percentage points. This is almost five times higher than the baseline probability. The effect of being a bondholder is highly significant ($t = 15.09$) when the standard errors are two-way clustered by fund and quarter.

This strong relation between being an existing bondholder and the participation in new issuances is not driven by the fact that some issuances are larger and more popular than other issuances, since such variation is captured by issuance fixed-effects.

[17] Since I only observe bond holdings at quarter-ends, I classify any bonds that are issued within the quarter as "newly-issued" bonds. I use mutual funds' holdings of these "newly-issued" bonds as a proxy for their real participation on the primary market. To the extent that secondary-market trading takes place between bond issuances and quarter-ends, it is a noisy measure.

[18] Only domestic non-financial corporate bond offerings are included in the sample. An offering must not be issued as an "exchange" for an outstanding bond issue. There are 6,339 distinct bond issuances and 1,211 distinct mutual funds. The sample construction results in 5,644,426 pairs of issuance-funds.

Neither is the statistical relation driven by the size and number of positions of the bond funds, since such relation should be subsumed by fund-by-quarter fixed-effects.

One potential explanation for the observed pattern is that some funds may focus on investment-grade bonds, and are prohibited from holding high-yield bonds. To account for this alternative explanation, I construct a subsample that only includes pairs of investment-grade issuances and investment-grade-focused funds, or pairs of high-yield issuances and high-yield-focused funds.[19] Within this subsample, being an existing bondholder increases the probability of a fund's participation in the new offering by 12.1 percentage points (Column (2)). Hence, restrictive investment objectives are not a main driver for the observed patterns.

Another potential explanation is that some bondholder mutual funds have maturing bonds from the issuer, and are simply rolling over their positions. In Column (3) of Panel A, Table 1, I exclude all bond offerings where the issuer has maturing bonds in the offering quarter or the subsequent quarter. The result shows that the coefficient on $D(Bondholder)$ actually increases slightly from 0.128 to 0.136, as compared to the baseline result in Column (1). This suggests that rolling over existing bonds cannot explain why existing bondholders are more likely to participate in new offerings.[20]

Now I turn to the intensive margin. Conditional on participating in bond offerings, do existing bondholders purchase larger fractions of the new issue relative to other participants? To answer this question, I estimate the following equation:

$$allocation_{i,j,t} = \alpha + \beta_1 D(Bondholder)_j + \beta_2 X_{j,t} + \epsilon_{i,j,t} \tag{2}$$

where *allocation* is defined as the par value a mutual fund holds as a fraction of the

[19] I define *investment-grade-focused* funds as funds whose holdings are mainly investment-grade bonds, and *high-yield-focused* funds as funds whose holdings are mainly high-yield. The definition of investment focus is done in the quarter prior to the issuances.

[20] Most bond mutual funds do not hold bonds to maturity. They benchmark against a corporate bond index that has minimum maturity rule. For example, bonds that have maturity shorter than one year are excluded from Bloomberg Barclays U.S. Aggregate Bond Index.

total par value issued in the offering. $X_{j,t}$ are the characteristics of mutual fund j.

Results in Panel B of Table 1 show that existing bondholders on average acquire larger fractions of new bond offerings, conditional on participating. In Column (1), existing bondholders on average purchase 0.289 percentage points more new issues, relative to other participants. The increase in allocation is economically large, because on average a participating bond fund is allocated with 0.6 percentage points of a new issue. In Column (2), the coefficient on fund flow is positive, indicating that stronger fund flows are associated with having more shares in a given bond issuance. More importantly, the interaction between fund flows and $D(Bondholder)$ is positive and significant. This suggests that existing bondholders are particularly aggressive in deploying their fund flows to these new issues.

In Column (3) of Panel B, Table 1, in addition to the $D(Bondholder)$ binary variable, I include a continuous variable – the portfolio weight of firm i's outstanding bonds in fund j's portfolio prior to the issuance.[21] The coefficient on *existing bond portfolio weight* turns out to be positive and significant. For a one percentage point increase in the weight of firm i's bond in fund j's portfolio, fund j will purchase 0.134 percentage points more. This result shows that *both* a mutual fund's status of being an existing bondholder and its size of portfolio position in the issuing company increases the amount of its new-issue acquisition.

2.3 Bondholder Flow: A Firm-level Capital Supply Measure

Given the inclination for bond funds to provide capital for their portfolio companies, it is natural to hypothesize that when a particular fund j receives a large capital inflow, it would disproportionally increase the available capital supply for firms in fund j's portfolio, if these firms choose to issue new bonds. This is the intuition behind my firm-specific capital supply measure. More specifically, I first define fractional fund

[21] For non-bondhodlers, this variable is set to zero.

flows as dollar fund flows divided by lagged fund TNA:

$$Flow_{i,t} = \frac{TNA_{i,t} - (1 + Ret_{i,t}) * TNA_{i,t-1}}{TNA_{i,t-1}} \tag{3}$$

I then aggregate the product of fund flows and the amount of issuer's bond held by the fund for all existing bondholder mutual funds of issuer i, scaled by the total amount of bonds outstanding for issuer i at quarter $t-1$. I call this measure *bondholder flow* ($BHFlow$).

$$BHFlow_{i,t} = \sum_{j \in J_i} (Flow_{j,t} * \frac{BondHoldings_{i,j,t-1}}{OutstandingBonds_{i,t-1}}) \tag{4}$$

This measure is calculated quarterly. In my tests, I take the sum of $BHFlow$ from the four preceding quarters as the main explanatory variable.

$BHFlow$ represents the amount of capital supply for firm i's new issue under the following assumptions: Suppose bond funds keep constant portfolio weights across underlying companies; Whenever they receive capital flows, they spend the additional dollar proportionally by acquiring new bonds issued by their portfolio companies. The denominator of $BHFlow$ is the amount of bonds outstanding for the issuer. This construction takes into account the economic importance of mutual fund ownership for a given issuer. For the same fund flows, $BHFlow$ is larger in absolute value if mutual funds collectively own a large fraction of a firm's bonds. During the sample period, mutual funds are a class of increasingly important investors in the corporate bond market. Their average market share for newly-issued bonds is 16.3%.[22]

Since I argue that bondholder flow has a strong impact on the capital supply coming from existing bondholders, in the data I empirically relate $BHFlow$ and the ex post allocation to existing bondholders. Although ex post allocation is not the

[22] Panel (a) of Figure 2 plots the time series of mutual funds' ownership share for all corporate bonds and for newly-issued bonds from 1998 to 2014, constructed from my sample. Panel (b) of Figure 2 plots the ownership share of mutual funds for investment-grade bonds (10.2%) and for high-yield bonds (24.9%), both in terms of new issues.

same as ex ante capital supply, the results are indicative. In Figure 3, I sort issuances based on their $BHFlow$, and calculate the average allocation to existing bondholders within each group. In both the investment grade segment (upper panel) and the high yield segment (lower panel), the new-issue allocation to existing bondholders is monotonically increasing in $BHFlow$, suggesting that $BHFlow$ is an effective measure for firm-specific bond capital supply.

Mutual fund flows are not randomly assigned. One main determinant of fund flows is the past performance of mutual funds. The flow-performance relationship has been shown to be significant for both equity funds (e.g., Sirri and Tufano (1998)) and bond funds (Goldstein et al. (2017)). To further isolate the variations in bondholder flow that is not driven by performances or characteristics of mutual funds, I construct an alternative measure called *residual bondholder flow* ($BHFlow^{res}$). The construction of this variable follows a two-step procedure. First, I regress fund-level flows on the past returns of the mutual fund and other characteristics, and extract the unexplained flows ("residual flows"). Second, I aggregate the residual flows to bond issuer level.

The fund flow regression is run at fund-quarter level. I decompose fund flows as

$$Flow_{i,t} = \alpha + \beta_1 Low_{i,t-1} + \beta_2 Mid_{i,t-1} + \beta_3 High_{i,t-1} + \gamma CatFlow_{i,t} + Controls + \epsilon_{i,t} \quad (5)$$

where $Low_{i,t-1}$ represents the performance rank in the lowest quintile, $Mid_{i,t-1}$ represents the performance rank in quintile 2-4, and $High_{i,t-1}$ represents the performance rank in the highest quintile.[23] $CatFlow_{i,t}$ is the average flow of mutual funds in the same investment category. The results are shown in Table A1. Using the residual flow estimated from the specification in Column (2), I construct the alternative capital

[23]The fund performance is ranked by their 12-month rolling alpha from the equation:

$$ExRet_{i,t} = \alpha + \beta_1 StockExRet_t + \beta_2 BondExRet_t + \epsilon_{i,t}$$

For fund i with fractional rank $Rank_{i,t-1}$, the definition is as follows: $Low_{i,t-1} = Min(Rank_{i,t-1}, 0.2)$,$Mid_{i,t-1} = Min(0.6, Rank_{i,t-1} - Low_{i,t-1})$, and $High_{i,t-1} = Rank_{i,t-1} - Low_{i,t-1} - Mid_{i,t-1}$

supply measure, residual bondholder flow:

$$BHFlow_{i,t}^{res} = \sum_{j \in J_i} \frac{\epsilon_{j,t} * BondHoldings_{i,j,t-1}}{\sum_{j \in J_i} BondHoldings_{i,j,t-1}} \tag{6}$$

3 Main Results

The main goal of this section is to establish the relation between capital supply driven by bondholders' fund flows and corporate decision to issue new bonds. Higher bondholder flow increases the probability of issuances, and lowers the financing costs associated with the new issues.

3.1 Sample Construction and Summary Statistics

To conduct firm-level analysis, I construct a panel of bond-issuing companies. To be included in the sample, a firm-quarter has to have outstanding straight bonds that has at least one mutual fund bondholder. By construction all new bond issuances in the sample are seasoned bond offerings. For new issuances, I only include non-convertible corporate bonds that are issued by U.S. companies. Following the literature, I drop bonds with put options or with floating rates. Finally, to ensure the availability of firm-level accounting data, only U.S. public companies are included in the sample. In the end, my sample has 52,247 firm-quarters with 1,126 distinct issuers. The sample period spans from 1998 to 2014.

In Table 2, I show the summary statistics for all the firm-quarters in my sample. In Panel A, the cumulative $BHFlow$ in the most recent four quarters is on average 1.70% of a firm's total outstanding bonds, with a standard deviation of 3.47%. It should be noted that, since the average amount of new issuance is about 35% of a firm's outstanding bonds, this indicates that one standard deviation of $BHFlow$ accounts for about 9.9% of the new issue amount. In Panel B, I sort firms into quintile groups

based on their $BHFlow$ each quarter. The probability of bond issuance is 10 percent for the group of firm-quarters with the highest $BHFlow$ while firms in quintile 1-4 on average have an issuance probability of 6 to 7 percent. Examining the characteristics of firms in different quintile groups, I find that firms in high-flow groups tend to be larger, and are more likely to have an investment-grade rating. With respect to other observables, it appears that there is no clear association between $BHFlow$ and market-to-book ratio, book leverage, capital expenditure, R&D expense, asset tangibility, ROA, or stock returns.

3.2 Empirical Specifications

Section 1 shows that existing bondholders of a given issuer are the main contributors of capital for firms' bond issuances. Building on this stylized pattern, I conjecture that fund flows to a firm's existing bondholders should lower the financing costs of issuing bonds for the portfolio companies. If firms understand the relation between investors' capital supply and the financing costs, they should be more likely to issue additional bonds when their bondholder flow is high.

Hypothesis 1. *Bondholder flow positively predicts firms' new bond issuances.*

Hypothesis 2. *Bondholder flow negatively predicts firms' costs of bond financing.*

To test Hypothesis 1, I conduct panel regressions with time fixed-effects as follows:

$$D(Issuance_{i,t+1} > 0) = \alpha_t + \beta BHFlow_{i,t-3,t} + \gamma X_{i,t}^{firm} + \epsilon_{i,t} \tag{7}$$

where $X_{i,t}^{firm}$ is a vector of firm-level characteristics, including the past returns of the issuer's outstanding bonds. The standard errors are two-way clustered by quarters and by issuers (Petersen (2009)).

If a firm issues a bond at any time during Quarter t+1, the dependent (dummy)

variable, $D(Issuance > 0)$, is assigned a value one.[24] The independent variable of interest, $BHFlow$, is measured as the cumulative quarterly fund flows defined in Equation (4) during the four quarters that precede the issuance quarter (Quarter t-3 to Quarter t). For ease of interpretation, I standardize the $BHFlow$ variable displayed in the tables shown in this paper. For some specifications, I use the alternative capital-supply measure, $BHFlow^{res}$ (defined in Equation (6)).

To control for firms' demand for debt financing, I include a wide range of firm-level characteristics.[25] The capital structure literature has shown that large companies have better access to the bond capital markets and hence are more likely to issue. Market-to-book ratio proxies for the growth opportunity of the firm, and firms with stronger growth opportunities have more to lose from the hold-up problem associated with debt-financing. Capital expenditure ($CAPX$) measures the firm's need of general financing. Asset tangibility is correlated with the firm's ability to post collateral for debt. Return on Assets (ROA) evaluates a firm's profitability and its need for tax shields. The rating of the issuer summarizes the creditworthiness of the firm. Finally, the past returns of the firm's stock and outstanding bonds capture the unobservable changes to the investment opportunities and creditworthiness.

To test Hypothesis 2, I regress the offering yield spread of bond i issued at quarter $t+1$ on both bond-specific variables and firm-level controls:

$$yield\_spread_{i,t+1} = \alpha_{i,t+1} + \beta BHFlow_{i,t-3,t} + \gamma X_{i,t}^{firm} + \phi Z_{i,t+1}^{bond} + \epsilon_{i,t+1} \qquad (8)$$

The capital supply variable $BHFlow$ is evaluated as the average of the four preceding quarters. Again, I control for time fixed-effects to subsume any time-series variation in market conditions. In addition to firm characteristics, I also control for bond-specific characteristics, since the regression is run at bond-issue level.

[24] I multiply all coefficients/marginal effects by 100 to ease the exposition. The magnitude can be interpreted as percentage points in the likelihood of issuing new bonds.

[25] For some reference, see Titman and Wessels (1988), Frank and Goyal (2009)

The bond-specific control variables include the offering amount of the bond (in logarithm), the maturity of the bond (in logarithm), whether the bond is privately placed under Rule 144A, numerical bond ratings, and two dummies that indicates the credit rating of the bond at issuance (whether it is below A- rating and whether it is below BBB- rating).[26] Bonds that have larger offering amounts and longer maturities carry higher risks and usually command higher yields. Lower-rated bonds also require a higher offering yield spread.

3.3 Capital Supply and Bond Issuance Decisions

Table 3 displays the regression results from Equation (7). Unconditionally, 7.1% of the firms issue new bonds at a given quarter. Columns (1) shows that a one standard deviation change in $BHFlow$ is positively associated with a 0.94 percentage points change in the probability of issuing new bonds in the next quarter. This effect is about 13.3 percent to the mean level of issuance probability, and it is statistically significant ($t = 4.90$). The standard error are two-way clustered by issuer and quarter. Hence, the supply of capital on the corporate bond market has an economically meaningful impact on the issuance decision of companies, confirming the first main prediction of this paper.

Most of the control variables have the anticipated relation with bond issuances as well. For example, larger firms, more profitable firms, and firms with more investment needs (i.e. high $CAPX$) are more likely to issue bonds, while growth firms and high-leverage firms tend to issue less bonds often. Importantly, the relationship between $BHFlow$ and the ensuing bond issuance activities is robust to controlling for past returns of the issuer's outstanding bonds. This addresses the concern that $BHFlow$ may be correlated with the future prospect of the issuer, through the channel of

[26] I do not include coupon rate of the bond. Campbell and Taksler (2003), in investigating the secondary bond market, point out that bonds with a higher coupon rate are at a tax disadvantage and are associated with higher yields. However, since many issuers target to issue at par, coupon rate and offering yield is highly correlated ($corr = 0.99$) in the sample.

fund performances. While 12-month issuer bond return is positively associated with likelihood of new issuances, the effect of $BHFlow$ is highly significant.

Columns (2) and (3) of Table 3 further use fixed-effects to absorb variation that may confound the interpretation of the baseline results. In Column (2), I include industry-by-quarter fixed-effects, where industries are classified by two-digit SIC. It further sharpens the identification since firms' demand for debt is likely to comove within industries. In a given time period within the same industry, firms with a one standard deviation higher $BHFlow$ issue new bonds with a probability that is 0.883 percentage points higher. In Column (3), I include investment-grade-by-quarter fixed-effects. Bond funds are often segmented into investment-grade funds and high-yield funds. Hence the flow-induced capital supply $BHFlow$ is likely to have a component that covaries within each segment. After controlling for the fixed-effects, a one standard deviation increase in capital supply is still associated with a 0.812 percentage point increase in the probability of issuing new bonds ($t = 3.84$). These findings suggest that the explanatory power of $BHFlow$ is likely to come from its impact on the capital supply, instead of unobservable demand for debt.

In Column (4), I use a logistic model with only quarter fixed-effects. The marginal effect evaluated at sample mean is 0.706 percentage points for a one standard deviation of $BHFlow$. Comparing the marginal effects obtained from the logistic model with coefficients from linear probability model, it is reassuring that the effects for most of the explanatory variables are similar across specifications.

I interpret the relationship between $BHFlow$ and corporate bond issuance as a capital-supply effect. The identifying assumption is that, conditional on firms' bond performance and other characteristics, $BHFlow$ is uncorrelated with firms' demand for debt. This is a plausible assumption, since there are many factors determining the flow to a firm's mutual fund bondholders. For example, what other companies' bonds are held together in a same portfolio with the issuer's bonds may be orthogonal

to the debt demand of the issuer in question. Nevertheless, I further narrow down the fraction of bondholder flow variation used in predicting future bond issuances. In particular, I decompose fund-level flows into an explained component and an unexplained component. The unexplained component of fund flows are then aggregated to firm level as $BHFlow^{res}$ (Equation 6). In Columns (5) to (7) of Table 3, I replace the $BHFlow$ measure with residual bondholder flow, $BHFlow^{res}$. The identifying assumption associated with $BHFlow^{res}$ is more relaxed than the original assumption: it only requires that non-fundamental-driven fund flows to a firm's bondholders is (conditionally) uncorrelated with firm demand for debt.

In Column (5) of Table 3, a one standard deviation increase in $BHFlow^{res}$ positively predicts a 0.656 percentage points increase in quarterly bond issuance probability. The effect is statistically significant at 1% level ($t = 3.39$). Although the magnitude of this coefficient is about one third smaller than the coefficient on $BHFlow$, the predictive power of $BHFlow^{res}$ is still economic important. In Columns (6) and (7), I show that the predictive power of $BHFlow^{res}$ is robust after controlling for quarter-by-industry fixed-effects and quarter-by-investment-grade fixed effects.

Overall, the results in Table 3 show that capital supply provided by existing mutual fund bondholders is an effective driver in corporate bond issuance decisions. These findings are consistent with recent capital supply research, which mainly focus on firms' bank loans (e.g., Faulkender and Petersen (2006), Leary (2009), Sufi (2009)). My findings suggest that, even for bond issuances, there is significant segmentation. As a result, firms' financing abilities are affected by the funding conditions of their existing bondholders.

3.4 Capital Supply and Bond Financing Costs

Why do fund flows from an issuer's existing bondholders induce more bond issuances? The most direct explanation is that the increased capital supply reduces the financing

costs for the associated firms. In this section I examine this relation in the data.

Table 4 shows the OLS regression results on the offering yield spread of newly-issued corporate bonds. The offering yield of bond issuances is arguably the most important parameter in a firm's decision on issuances. It directly affects the financing cost for the firms. At issuance, I calculate the offering yield spread between the yield of a bond and the treasury bond with the closest maturity. The key variable, $BHFlow$, is standardized to facilitate the interpretation. In Column (1), a one standard deviation increase in $BHFlow$ is associated with a 5.55 basis points decrease in the offering yield spread. The relation is statistically significant as $t = 2.92$ when the standard errors are two-way clustered by offering quarters and issuers. Quarter fixed-effects absorb variations in macroeconomic environments.This negative association indicates that when an issuer's existing bondholders receive higher fund flows, the firm can raise bond capital at a lower cost.

The negative relation between the offering yield spread and the bond capital supply cannot be attributed to macroeconomic conditions, bond characteristics, or the financial standings of the issuer firm. Most control variables have the expected sign with respect to the offering yield spread. For example, deals with a larger offering amount, longer maturity, and higher coupon rates demand a higher yield to compensate for the risks, as do privately placed bonds. Firms that are smaller, more highly-levered, less profitable, and have lower credit ratings have a higher bond offering yield as well. Issuers with better past equity returns or bond returns tend to have lower offering yield as well.

In terms of the economic magnitude for the change in offering yield, if we take a median bond in my sample (10-year maturity, 5.95% YTM), a decrease of 5.55 basis points in offering yield corresponds to an increase in offering price by about 40 basis points. This is quite comparable to the amount of money issuers pay to their underwriters for bond issuances, which typically about 60 basis points in my sample.

In Column (2) of Table 4, quarter-by-industry (SIC2) fixed-effects are included, and the term spread and credit spread variables are dropped from the regression. The effect of bondholder flows is slightly weaker but still negative and highly significant at -5.10 basis points ($t = 2.67$). This specification indicates that for bonds issued in the same time period by firms within the same industry, stronger capital supply is still associated with lower financing costs.

The specification in Column (3) includes quarter-by-rating fixed-effects to control for time-varying, unobservable heterogeneity between different ratings. Each rating (for example, "AA" and "AA-") is assigned with a numerical value. Even within the tight specification of same-rated bonds issued in the same quarter, a one standard deviation increase in $BHFlow$ is associated with a 4.43 basis points lower offering yield spread.

In Columns (4) to (6), I repeat the analyses with the residual bondholder flow, $BHFlow^{res}$, as the proxy for firm-specific capital supply. This proxy captures the non-fundamental-driven component of mutual fund flows aggregated to the issuer level. $BHFlow^{res}$ is shown to also have a negative relationship with bond offering yield spread as well. In Column (4), a one standard deviation increase in $BHFlow^{res}$ predicts a 5.75 basis points decrease in the offering yield spread ($t = 2.55$). The magnitude of the coefficient is about the same as the magnitude of the coefficient on $BHFlow$. In Columns (5) and (6), when quarter-by-industry and quarter-by-rating fixed-effects are included, the effect of $BHFlow^{res}$ reduces moderately to between 3.10 to 4.02 basis points, but is still statistically significant.

To summarize, I find that firms' bond financing costs are *lower* when firm-specific capital supply is higher. Both $BHFlow$ and $BHFlow^{res}$ negatively predict offering yield spreads.[27] The joint observations that stronger bondholder flows are associ-

[27] In an untabulated test, I use the *ex post* fraction of new bonds allocated to existing bondholders to explain bond offering yields, and find a significant negative relationship. This result is available upon request.

ated with more bond issuances and higher bond prices suggest that bondholder flow captures a shift in the supply curve of credit on the corporate bond market.

4 Additional Evidence

In this section, I conduct a multitude of additional tests to further rule out potential demand-side explanations for the observed bond issuance patterns. I examine (1) the relation between bondholder flow and firms' alternative sources of financing, and (2) firms' investment decisions following bond issuance.

4.1 Substitution Effects on Other Forms of Financing

If $BHFlow$ captures changes in firms' fundamentals that correlate with their total financing demand, one should expect a higher likelihood of issuing equity when bondholder flow is high. In contrast, if $BHFlow$ captures a shift in capital supply curve that is specific to bond financing, firms should move away from equity financing and satisfy their financing needs via bond issuances when $BHFlow$ is high.

To distinguish these two alternative hypotheses, I regress firms' equity issuance on $BHFlow$ and other explanatory variables:

$$D(EquityIssue_{i,t+1} > 0) = \alpha_t + \beta BHFlow_{i,t-3,t} + \gamma X_{i,t}^{firm} + \epsilon_{i,t+1} \tag{9}$$

The dependent variable is a dummy indicating that Firm i conducts a seasoned equity offering (SEO) in Quarter $t+1$. All specifications include quarter fixed-effects to absorb the effect of macroeconomic environments.

Panel A of Table 5 shows that $BHFlow$ negatively predicts the future likelihood of issuing equity. For example, in Column (1), a one standard deviation increase in $BHFlow$ decreases future probability of equity issuance by 0.132 percentage points. Considering that SEOs are unconditionally quite rare (1.9% per quarter), this drop in

issuance probability is economically meaningful. The negative relation is statistically significant ($t = 2.04$) when the standard errors are two-way clustered by firm and by quarter. It is robust to the inclusion of quarter-by-industry fixed-effects (Column (2)) or quarter-by-investment-grade fixed-effects (Column (3)). In Columns (4) to (6), I use the amount of new equity issuance, scaled by total assets, as the dependent variable. $BHFlow$ is shown to have a negative relation with equity issuance activities.The negative relation between bondholder flows and equity issuance suggests that $BHFlow$ is unlikely to correlate with unobserved firms' total financing needs.

A second concern that I address is that bondholder flow captures unobserved increase in a firm's optimal debt ratio. To provide empirical evidence against this argument, I examine a subset of companies in my sample that use both public debt via the bond market and private debt through bank loans. If changes in bondholder flow coincide with an increase in the optimal leverage ratio, one should expect a positive association between bondholder flows and bank loans as well. On the contrary, if bondholder flows only shock the capital supply conditions with respect to bond financing, firms should substitute private debt for public debt.

To ensure that a firm have both bank loans and public bonds in their choice set, I require a firm-quarter to have initiated term loans in the past five years. I then intersect these firm-quarters with the sample of firms that have outstanding bonds. The resulting sample consists of 17,596 firm-quarters that in theory have access to both public and private debt. I then examine whether bondholder flow induces more or less private debt issuances by running the following regression:

$$D(NewBankLoan_{i,t+1} > 0) = \alpha_t + \beta BHFlow_{i,t-3,t} + \gamma X_{i,t}^{firm} + \epsilon_{i,t+1} \qquad (10)$$

The dependent variable is a dummy indicating that Firm i initiates a new term loan in Quarter $t + 1$.

The results in Panel B of Table 5 show a negative relation between $BHFlow$ and firms' probability of initiating new bank loans. On average, firms in my sample have a probability of 5.8% to obtain new term loans from their bank each quarter. In Column (1), a one standard deviation increase in $BHFlow$ lowers firms' chance of initiating new loans by 0.4 percentage points, or 6.9 percent to the mean. The negative relation between $BHFlow$ and firms' decisions to obtain new bank loans is robust to the inclusion of quarter-by-industry fixed-effects (Column (2)) and quarter-by-investment-grade fixed-effects (Column (3)). Moreover, in Columns (4) to (6), I replace the binary dependent variable of future bank loan initiations with a continuous variable that represents the amount of newly-initiated bank loans, scaled by lagged total assets. The average amount of new bank loans decreases by 0.0362% to 0.0525% following an increase in the bond capital supply.

Taken together, the negative relation between bondholder flow and both firms' equity issuance and the their new bank loans indicates that bondholder flow captures capital supply shock specific to bond financing. Stronger bondholder flows make public debt more attractive to the issuers and these firms take advantages of the less expensive source of capital.

4.2 Use of Issuance Proceeds

To further rule out the alternative explanation that the relation between bondholder flow and firms' bond issuances is driven by unobservable investment opportunities, I examine issuers' investment decisions after bond issuances. If bondholder flow covaries with firms' investment opportunities, one should expect that firms that issue under a high bondholders flow spend a larger fraction of proceeds in investments. In this section, I show that this is not the case.

I estimate an equation conditional on bond issuances on firm-year (i, t), similar to the settings of Kim and Weisbach (2008). Since the various uses of proceeds are

reported by the firms at annual interval, I aggregate the each firm's $BHFlow$ by summing up the quarterly $BHFlow$ during year $t-1$. I create $D(HighFlow)$, an indicator that equals one if an issuance takes place following a firm-year in which the $BHFlow_{t-1}$ is in the top quartile.[28]

$$\begin{aligned} Y_t =& \alpha_t + \beta_1 \frac{IssueAmt_{i,t}}{TotalAssets_{i,t}} + \beta_2 D(HighFlow_{i,t-1}) * \frac{IssueAmt_{i,t}}{TotalAssets_{i,t}} \\ &+ \beta_3 D(HighFlow_{i,t-1}) + \epsilon_{i,t} \end{aligned} \tag{11}$$

The outcome variable Y_t represents capital expenditure ($\frac{CAPX_t}{AT_t}$), R&D expense ($\frac{RnD_t}{AT_t}$), acquisition expenses ($\frac{Acq_t}{AT_t}$), total investments ($\frac{InvestTotal_t}{AT_t}$), change in cash holdings ($\frac{\Delta Cash_t}{AT_t}$), and equity dividends and repurchases ($\frac{Payout_t}{AT_t}$).

The coefficient of interest is β_2, which indicates whether firms that issue bonds with higher $BHFlow$ behave differently relative to firms that issue bonds under normal capital supply. If an unobservable demand for debt confounds the observed issuance behavior, one should expect firms that issue under higher $BHFlow$ to invest a larger fraction of their proceeds into new projects.

I find that firms that issue under higher $BHFlow$ tend to invest *less* of its proceeds, as compared with other issuers. Columns (1) through (3) of Table 6 display the regression results for investment items. For issuers who offer bonds under normal $BHFlow$, for every dollar raised on bond issuances, firms spend 14.3 cents on capital expenditure, 5.07 cents on research and development, and 39.4 cents on acquisitions. In contrast, a firm that issued under the highest quartile of $BHFlow$ invests 12.7 cents *less* on capital expenditure ($t = 2.54$), 2.39 cents more on research and development ($t = 1.58$), and 7.86 cents less in acquisitions ($t = 1.46$). Put together (Column (4)), a firm that issued bonds under the bottom three quartiles of $BHFlow$ invests 58.5 cents for every dollar of proceeds, while a high-flow firm invests 18.3 cents less. The

[28]The firm-years with $D(HighFlow) = 1$ have an average cumulative $BHFlow$ of 6.68% at year $t-1$, while the firm-years with $D(HighFlow) = 0$ has an average cumulative $BHFlow$ of 0.39%.

reduction in incremental investment spending is highly significant ($t = 2.91$). The reduced amount of incremental investments indicates that it is unlikely that firms that issue under high $BHFlow$ have an unobserved improvement in investment opportunities. This further supports the argument that $BHFlow$ captures a supply-side effect.

Columns (5) and (6) of Table 6 examine other uses of issuance proceeds: cash savings and payouts to equity holders (as dividends or repurchases). In Column (5), firms that issue bonds hold 11.9 cents, on average, out of every dollar cash holdings. There is no statistical difference for the cash savings if a firm issues bonds under high $BHFlow$, though the point estimate is positive ($\beta_2 = 0.0725$). In addition, high-flow firms tend to pay out more proceeds to their equity holders: For every dollar raised through bond offerings, they out an additional 6.87 cents relative to other issuers. This difference is statistically significant at conventional level ($t = 1.81$).

In summary, I do not find evidence that bondholder flow is positively associated with firms' tendency to make more investments. This suggests that unobserved investment opportunities are unlikely to coincide with bondholder flow. It supports the argument that the relation between bondholder flows and firms' issuance responses captures a capital supply effect.

4.3 An Exogenous Shock: Bill Gross' Resignation from PIMCO

In this section, I further strengthen the identification of this paper by using an exogenous shock to the amount of capital held by a major bond mutual fund, PIMCO.

The Pacific Investment Management Company (PIMCO) is the largest fixed income investment company in the U.S., holding about 240 billion dollar worth of corporate bonds at the end of 2013. On September 26th, 2014, Bill Gross, the chief investment officer of PIMCO, abruptly announced his departure from the company he founded. Bill Gross was hailed as the "Bond King" on the Wall Street. Although

there were reports of internal power struggle between Gross and other PIMCO executives before the resignation, market participants were shocked by the news.[29] Bill Gross' departure from PIMCO triggered large outflows from the funds he managed at PIMCO and, to some extent, all PIMCO funds. Investors are uncertain about the future prospects of PIMCO and the future leadership structure without Bill Gross. In Figure 4, I plot the monthly flows and cumulative flows for Gross' Total Return Funds and all other funds in the PIMCO family. During the first twelve months after Gross' departure, PIMCO lost about 25% of its total net assets.[30]

Suppose that a firm has PIMCO as a major bondholder. Given PIMCO's size and prominence in the bond market, the firm is likely to rely on PIMCO as a main capital contributor for bond issuances. When Bill Gross left, PIMCO funds suffered large and persistent outflows and were less able to contribute capital to future bond offerings.[31] If this firm decides to issue new bonds, it must either convince additional investors to fill the void left by PIMCO, or ask other frequent investors to contribute larger amount of capital. Both are difficult. Hence, one should expect a decrease in issuance activities by these PIMCO-affected companies.

A difference-in-differences framework is suitable to test this hypothesis. I define treated firms as issuers whose bonds were overweighted by PIMCO portfolios at the end of 2014Q3.[32] A potential selection bias is that asset managers such as PIMCO tend to hold more bonds which are recently issued. Issuers in PIMCO's portfolios are, on average, 2.6% more likely to have issued bonds relative to a random issuer (untabulated). To overcome this selection problem, I construct a "synthetic portfolio" by

[29]For example, see "Bill Gross, King of Bonds, Abruptly Leaves Mutual Fund Giant PIMCO", *The New York Times*, September 26, 2014

[30]For the 12-month period prior to Bill Gross' resignation, the performance of PIMCO Total Return Fund was ranked at 49th percentile within its investment style by Morningstar.

[31]Janus Capital Management, the fund family Bill Gross joined, was too small to step up to provide enough capital for these firms. Janus only managed about 14.1 billion dollars in corporate bonds, less than 6% of PIMCO's assets.

[32]Since PIMCO's market share of corporate bonds at the time of Gross' departure is three percent, my treated group consists of firms that have three percent of their outstanding bonds in PIMCO portfolios.

combining the holdings of Prudential Investment Management and Vanguard funds, the second and the third largest corporate bond holders in my sample.[33] Firms in this combined portfolio should be more suitable as the counterfactual had Bill Gross not left PIMCO. If a firm has a large fraction of outstanding bonds held by Prudential or Vanguard portfolios at the end of 2014Q3, it is included in the control group.[34]

In the end, I obtain 108 issuers in the treated group and 278 issuers in the control group. In Table 7, I compare the characteristics of the two groups of firms before the event. Treated firms and control firms are similar in most dimensions (e.g. market cap, leverage, capital expenditure, past bond returns). The two characteristics that they differ significantly before the event are market-to-book (treated firms have higher MB ratio) and return on assets (control firms have higher ROA). Since treated firms and control firms are mostly similar along observables, it is reasonable to attribute subsequent changes in issuance behavior to the exogenous shock of Bill Gross' departure. The before-event period is the eight quarters between 2012Q4 and 2014Q3, while the post-event period is between 2014Q4 and 2016Q3.[35]

To formally test the impact of PIMCO's outflows on bond issuances of its portfolio companies, I run regressions with a linear probability model:

$$\begin{aligned} D(Issuance_{i,t} > 0) =& \alpha + \beta_1 D(PIMCO) * D(post) + \beta_2 D(PIMCO) \\ &+ \beta_3 D(post) + \gamma Control_{i,t} + \epsilon_{i,t} \end{aligned} \tag{12}$$

where the coefficient of interest is β_1, which is expected to be negative. The standard errors are two-way clustered by quarter and by issuer.

The results are shown in Table 8. The findings confirm the hypothesis that firms

[33] At the end of 2014Q3, PIMCO has the largest corporate-bond holdings at 236 billion dollars. Prudential and Vanguard has 168 and 148 billion dollars corporate bonds, respectively.

[34] I use the same three percent cutoff rule as in the treated group.

[35] Since Bill Gross left PIMCO days before the end of 2014Q3, it is reasonable to expect that the impact on firms' issuance activities take effect after 2014Q3. Hence, the quarter of the event itself is grouped into the before-event period.

in PIMCO's portfolio were impaired in their ability to issue new bonds after Gross' exit. In the simplest diff-in-diff setting, Column (1) shows that β_1 is -0.0345, which indicates that the quarterly probability of new issuances is 3.45 percentage points lower for a treated firm after the event when compared to the probability before the event, relative to control firms. This effect is both statistically significant ($t = 1.98$) and economically large. The pre-event average issuance probability in this sample is 15.1 percentage points, and the drop in issuance probability caused by the PIMCO event is equal to 23 percent of the baseline probability. Also important is the fact that issuers in the treated group and issuers in the control group do not seem to differ in their pre-event issuance probability. It reassures that the change in issuance probability for the treated firms is likely to be caused by Bill Gross' sudden resignation.

In Column (2) of Table 8, I control for various firm characteristics and macroeconomic variables. In Column (3), I include quarter fixed-effects to account for changes in market conditions from year to year. In Column (4), issuer fixed-effects are included to further absorb unobservable heterogeneity among firms. In each case, the interaction term between the treated dummy and post-event dummy has negative coefficient between 3.31% and 3.48%.

In Figure 5, I plot the average issuance probability for the treated and control firms over the 2012Q4-2016Q3 period. The figure shows a clear pattern: Before Bill Gross' departure, both treated firms and matched firms have similar probabilities of issuance. After the event (2014Q3), firms that were overweighted by PIMCO funds have a significantly lower chance of issuing new debt, while the issuance rate of the control firms remains steady. This divergence of issuance behavior after the exogenous change in fund management again suggests that the relation between existing bondholder's flow and corporate issuance activities is causal in nature.

Taken together, the evidence presented in this section is consistent with the pri-

mary findings of this paper: The variation in bond capital supply, induced by fund flows, significantly affects firms' decisions to issue new bonds. In this particular case, the massive outflows from PIMCO funds triggered by Bill Gross' departure affect the bond-issuing ability for firms who have relied on the capital contributions from PIMCO funds. Since the source of fund outflows is known and plausibly orthogonal to the debt demand of the treated firms, one can plausibly claim a causal relation between capital supply and corporate bond issuance decisions.

4.4 Economic Mechanisms

In this section, I examine two potential economic mechanisms through which existing bondholders are particularly likely to acquire new bonds from the company, hence affecting corporate issuance decisions. These two explanations are *information costs* and *underwriter relationship*.

Information Costs Investors incur information costs when investing in newly-issued corporate bond. They need to spend effort and money to be able to analyze the issuer's creditworthiness. Investors who are uncertain about companies' creditworthiness are only willing to pay for the average quality of the issuing firms. As a result, some firms prefer not to issue new bonds because pooling with lower-quality firms is too costly. This is the adverse selection problem described in Myers and Majluf (1984). Existing bondholders may have lower information cost than an average investor. The fact that they hold outstanding bonds of the same company indicates that they have established the capacity to value the issuers' bonds. In some sense, there is an increasing return to scale for their information (Van Nieuwerburgh and Veldkamp (2010)). It is similar to the information "reusability" (Chan et al. (1986)) in the banking literature.

If information costs explain the propensity for existing bondholders to acquire new

bonds from the same companies, one implication is that such association should be more pronounced for companies with higher information asymmetry. To empirically examine this, I revisit mutual funds' participation decisions in the bond issuance market. Specifically, I construct several proxies for firm-level information asymmetry, and interact the bondholder dummy with the dummy indicating high level of information asymmetry. According to the information costs explanation, the coefficient on the interaction term, β_2, is expected to be positive.

$$D(Participation_{i,j,t}) = \alpha_{i,t} + \alpha_{j,t} + \beta_1 D(Bondholder_{i,j,t-1}) + \beta_2 D(InfoAsym_{i,t}) * D(Bondholder_{i,j,t-1}) + \epsilon_{i,j,t} \quad (13)$$

Note that the base level of $D(InfoAsym_{i,t})$ is dropped from the regression because of firm-quarter fixed-effects.

To proxy for information asymmetry, I use four different measures: (1) bond ratings, (2) the length of bond issuance history, (3) analyst coverages, and (4) the number of secondary market trades for the firm's outstanding bonds. Worse bond ratings suggest that a firm is more likely to default, which increases the uncertainty for investors. Therefore, one would expect high-yield bonds to be more informational sensitive. A borrower's reputation is another factor with respect to information asymmetry (Diamond (1991)). I hypothesize that firms with a shorter issuance history are less reputable and thus subject more to the adverse selection problem. Analyst coverage is another proxy for the amount of available public information about a company. Issuers who have fewer analyst following them are more opaque, and may rely more on existing bondholders. Finally, secondary market trading on firms' outstanding bonds may provide information on the value of a firm's new bond offerings. Firms whose outstanding bonds have been less actively traded should have more severe information asymmetry.

Table 9 presents the results for how information asymmetry affects the participation of existing bondholders relative to non-bondholders. In Column (1), the coefficient on the interaction between bondholder dummy and indicator for high-yield bond is positive and significant. The effect of being an existing bondholder ($D(Bondholder)$) is 5.52 percentage points for investment-grade bonds, but 20.8 percentage points ($0.0552+0.153$) for high-yield bonds. The difference indicates that the issuances of lower-rated bonds rely more on the participation of existing bondholders. In Column (2) of Table 9, I interact bondholder dummy with a binary variable indicating that the firm's length of issuance history (since it first issued bonds) is shorter than the median issuer. The coefficient on the interaction is positive and significant at 2.81 percentage points ($t = 3.75$).

In Column (3), I interact bondholder dummy with an indicator showing that the number of analysts following a firm's equity is below the cross-sectional median. The positive and significant coefficient on the interaction term (6.49 percentage points, $t = 8.54$) suggests that firms with less analyst coverage rely more on the financing from existing bondholders. In Column (4), I interact bondholder dummy with an indicator for fewer previous bond trades. For each issuer-quarter, I calculate the number of trades on the firm's outstanding bonds during the previous quarter and assign below-median firm-quarters with value one. The effect of being an existing bondholder is 1.92 percentage points larger for fewer-trade firms than for more-trade firms.

These findings show that companies with more severe information asymmetry rely more on the capital contribution from existing bondholders. As a result, bond issuance decisions of high-information-asymmetry issuers should be more sensitive to the $BHFlow$ measure. I therefore examine the cross-sectional variation in bondholder flow sensitivities. Specifically, I re-estimate the corporate bond issuance decisions for

the panel of firm-quarters:

$$D(Issuance_{i,t+1} > 0) = \alpha_t + \beta_1 BHFlow_{i,t-3,t} + \beta_2 BHFlow_{i,t-3,t} * D(InfoAsym_{i,t}) + \gamma X_{i,t}^{firm} + \epsilon_{i,t} \quad (14)$$

If firms with more severe information asymmetry are indeed more sensitive to capital supply from existing bondholders, one should expect β_2 to be positive. I use the same set of dummies to proxy for higher level of information asymmetry.

Table 10 shows the results. To ease the exposition, I suppress the coefficients on firm characteristics (including $D(InfoAsym)$) in the table. In Columns (1), firms with non-investment grades are more sensitive to bondholder flow. This result is consistent with the findings in previous literature that firms with lower credit quality are more sensitive to the supply conditions of their capital (e.g., Erel, Julio, Kim, and Weisbach (2012)). In Column (2), I interact $BHFlow$ with an indicator that a firm has a relatively short history of issuing bonds compared to cross-sectional median. Firms with shorter issuance histories seem to be more reliant on capital supply from existing bondholders, though the coefficient on the interaction term is positive but statistically insignificant.

In Column (3) of Table 10, I interact $BHFlow$ with analyst coverage dummy. Consistent with my hypothesis, firms with less analyst coverage, hence more opaque information environment, are more sensitive to capital supply variations from their bondholders. In Column (4), the interaction is between $BHFlow$ and the dummy indicating that an issuer's outstanding bonds are less frequently traded than the median firm. The coefficient on the interaction term is positive at 0.75 percentage points and significant ($t = 2.41$). It suggests that firms with thinly traded bonds are particularly reliant on the capital contribution from their existing bondholders.

Taken together, the findings indicate that the impact of existing bondholders flows

on bond issuances is more pronounced for firms with more severe information asymmetry. This is consistent with the notion that companies rely on their bondholders to address information asymmetry in bond issuances.

Underwriter Relationship A second explanation for why existing bondholders play a particularly important role in bond issuances is their relationship with the underwriter. In the bond issuance market, investment banks typically serve as underwriters for issuers. In the meantime, the same set of investment banks usually also act as brokers when asset managers trade bonds. Some practitioners claim that underwriters favor their asset-manager clients in allocating "hot" bond issuances, which drew attention from the regulators.[36] Two contemporary working papers, Chakraborty and MacKinlay (2018) and Daetz, Dick-Nielsen, and Nielsen (2017), provide empirical evidence for the underwriter relationship in the corporate bond market. If existing bondholders are more likely to have relationship with the underwriter, and if investors who have relationship with the underwriters are more likely to obtain allocation of new issues, then underwriter relationship can explain the tendency for existing bondholders to keep investing in the company.

To empirically evaluate this explanation, I collect the identity of underwriter(s) for each bond offering from SDC database. Since I cannot directly observe which mutual funds are the "relationship investors" associated with an underwriter, I construct the set of relationship investors as follows: Each quarter, for a given underwriter, I summarize all the bond offerings that it has underwritten during the past year. Any mutual fund that has participated in those bond offerings are defined as "relationship investors" of the said underwriter. Since some investment banks underwrite a large number of bond offerings, if there are more than 50 mutual fund participants, I sum up the dollar amount of purchase made by each mutual fund from the underwriter,

[36] "Regulators Are Probing How Goldman, Citi and Others Divvied Up Bonds", *Wall Street Journal*, Feb. 28, 2014

and only keep the top 50 as relationship investors.

When there is a new bond offering, I define the "underwriter-related funds" as mutual funds that are the relationship investors of the deal's underwriter(s). For example, if General Mills issues a bond, which is underwritten by Goldman Sachs, then all the relationship investors of Goldman Sachs are considered underwriter-related funds of this issuance. In the cases of multiple underwriters, I take the union set of the relationship investors from each underwriter.

I create a dummy variable for underwriter-related funds in the issuance-participation regression and examine whether being an underwriter-related investor changes a mutual fund's probability of investing in a new bond offering. If relationship to the underwriter partially explains why existing bondholders are more inclined to invest in bond issuances, then one should expect (1) the status of underwriter-related funds increases the participation rate, and (2) the inclusion of underwriter-related funds dummy reduces the predictability of being existing bondholders.

$$D(Participation_{i,j,t}) = \alpha_{i,t} + \alpha_{j,t} + \beta_1 D(Bondholder_{i,j,t-1}) + \beta_2 D(UnderRelated_{i,j,t-1}) + \epsilon_{i,j,t} \quad (15)$$

Column (5) of Table 9 shows the result from the above regression. The coefficient on $D(UnderRelated)$ is positive at 5.13 percentage points and significant at conventional level ($t = 9.63$). This indicates that mutual funds that have participated in the recent bond issuances underwritten by the same book runners are more likely to participate in the bond issuance in question. This is consistent with the argument that underwriters are more likely to allocate new issuances to asset managers who have maintained a business relationship with them. Since existing bondholders are 14.9 percentage points more likely to have relationship with the underwriter (shown in Column (6)), a fraction of the explanatory power of existing bondholder on partic-

ipation rate derives from the fact that mutual funds with relationships to the bond underwriter are more likely to participate in bond offerings.

Equally importantly, the coefficient on $D(Bondholder_{i,j,t-1})$ in Column (5) is 12.0 percentage points, which is slightly lower than the baseline estimate at 12.8 percentage points (Column (1), Panel A of Table 1). This suggests that underwriter relationship alone does not completely explain existing bondholders' propensity to participate. In fact, it only accounts for an economically small fraction of the explanatory power of $D(Bondholder)$. This indicates that other factors, such as information costs, may be responsible for the effect of being an existing bondholder.

5 Conclusion

In this paper, I examine the impact of mutual fund flows on the issuance decisions made by corporations. The key innovation is to recognize that firms' ability to issue bonds can be affected by flows to mutual fund that are the existing bondholders of the company. The empirical pattern that existing bondhodlers tend to provide capiatl to firms' new bond offerings allows me to measure firm-specific capital supply by calculating bondholder flows. I show that strong bondholder flows predict a higher probability that a firm will issue new bonds in the future. Conditional on issuing new bonds, firms with higher capital supply enjoy lower offer yields.

These findings are unlikely to be explained by simultaneous changes in firms' demand for debt. First, bondholder flows have a negative relation with firms' propensity to issue equity or initiate new bank loans. Second, firms that issue bond under higher bondholder flows spend a smaller proportion of their proceeds in investments, compared with other issuers. Third, the supply effect is also observed using an exogenous shock to fund flows when Bill Gross abruptly left PIMCO funds.

The findings in this paper suggest that financial market frictions create segmen-

tation in the bond issuance market and affect corporate activities, especially their capital structure decisions. Although this general theme has been explored in the literature (e.g., Faulkender and Petersen (2006)), it is somewhat surprising that, even for firms with access to the bond market, their financing activities are still subject to market conditions. Particularly for firms with lower credit quality, their issuance ability is subject to shocks unrelated to the fundamentals of the firm. It also shed lights on how the increasing presence of mutual funds in the corporate bond market may change the way firms conduct bond financing. The finding that fund flows affect bond issuances, when considered along with previous studies on mutual fund "runs" (Goldstein et al. (2017), Zeng (2017)), suggests that bond mutual funds have the potential to transmit fragility in fund flows to the real sector.

Appendeix

Variable Definitions

Variables	Definition
Firm-level variables:	
$BHFlow$	Bondholder flow. Defined in Equation 4. Value-weighted aggregate flow of an issuer's mutual fund bondholders, scaled by total amount of bond outstanding for the issuer.
Bond Issuance Dummy	A binary variable that is set to one if a firm issues new straight bonds at current quarter, and zero otherwise.
Issuance Amount	The dollar amount of new straight bonds an issuer offers in a given quarter.
Market Capitalization	Stock price * Shares Outstanding
Total Assets	Book value of assets
Market-to-Book	The ratio between market value of equity and book value of equity
Book Leverage	The ratio between book value of debt ($dltt + dlc$) and book value of equity
Capital Expenditure	The ratio between capital expenditure ($capx$) and total assets
R&D Expense	The ratio between research and development expenses (xrd) and total assets
Tangibility	The ratio between property, plants, and equipments ($ppegt$) and total assets
Return on Assets	The ratio between operating income before depreciation ($oibdp$) and total assets
Maturing Debt	The ratio between debt in current liabilities (dlc) and total assets
Issuer Investment-Grade	A binary variable indicating that the issuer has a S& P long-term rating above BBB-
Past 12-Month Stock Return	The cumulative return of an issuer's equity during the past 12 months
Past 12-Month Bond Return	The (weighted-average) cumulative return of an issuer's outstanding bond(s) during the past 12 months
Equity Return Volatility	The standard deviation of an issuer's month equity returns during the past 12 months.
Issuance-level variables:	
Issue Offering Amount	The dollar amount of bonds offered in the issuance
Maturity	The length of maturity in number of years
Credit Rating (numerical)	The issue-specific S& PS credit rating expressed in numerics. For example, AAA rating corresponds to 1, AAA- corresponds to 2, BBB+ corresponds to 3, and so forth.
Rule 144A	A binary variable indicating that an issue is privately-placed under Rule 144A.

References

Alti, A. 2006. How persistent is the impact of market timing on capital structure? *The Journal of Finance* 61:1681–1710.

Alti, A., and J. Sulaeman. 2012. When do high stock returns trigger equity issues? *Journal of Financial Economics* 103:61–87.

Baker, M. 2009. Capital market-driven corporate finance. *Annu. Rev. Financ. Econ.* 1:181–205.

Baker, M., J. C. Stein, and J. Wurgler. 2003. When does the market matter? Stock prices and the investment of equity-dependent firms. *The Quarterly Journal of Economics* 118:969–1005.

Baker, M., and J. Wurgler. 2002. Market timing and capital structure. *The Journal of Finance* 57:1–32.

Bao, J., J. Pan, and J. Wang. 2011. The illiquidity of corporate bonds. *The Journal of Finance* 66:911–946.

Becker, B., and V. Ivashina. 2015. Reaching for yield in the bond market. *The Journal of Finance* 70:1863–1902.

Bessembinder, H., S. E. Jacobsen, W. F. Maxwell, and K. Venkataraman. 2017. Capital commitment and illiquidity in corporate bonds .

Boot, A. W. 2000. Relationship banking: What do we know? *Journal of Financial Intermediation* 9:7–25.

Cai, F., S. Han, D. Li, and Y. Li. 2017. Institutional herding and its price impact: Evidence from the corporate bond market .

Campbell, J. Y., and G. B. Taksler. 2003. Equity volatility and corporate bond yields. *The Journal of Finance* 58:2321–2350.

Chakraborty, I., and A. MacKinlay. 2018. The Underwriter Relationship and Corporate Debt Maturity .

Chan, Y.-S., S. I. Greenbaum, and A. V. Thakor. 1986. Information reusability,

competition and bank asset quality. *Journal of Banking & Finance* 10:243–253.

Chava, S., and M. R. Roberts. 2008. How does financing impact investment? The role of debt covenants. *The Journal of Finance* 63:2085–2121.

Chernenko, S., and A. Sunderam. 2012. The real consequences of market segmentation. *Review of Financial Studies* 25:2041–2069.

Chernenko, S., and A. Sunderam. 2016. Liquidity Transformation in Asset Management: Evidence from the Cash Holdings of Mutual Funds. *Working Paper, National Bureau of Economic Research* .

Choi, J., and M. Kronlund. 2017. Reaching for Yield in Corporate Bond Mutual Funds. *The Review of Financial Studies* 31:1930–1965.

Choi, J., and S. Shin. 2016. Is There Flow-Driven Price Impact in Corporate Bond Markets? *Working Paper, University of Illinois at Urbana-Champaign* .

Daetz, S. L., J. Dick-Nielsen, and M. S. Nielsen. 2017. The Value of Bond Underwriter Relationships. In *The 15th International Paris December Finance Meeting*.

Dass, N., and M. Massa. 2014. The variety of maturities offered by firms and institutional investment in corporate bonds. *Review of Financial Studies* p. hhu028.

Diamond, D. W. 1991. Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy* 99:689–721.

Dick-Nielsen, J. 2009. Liquidity biases in TRACE. *The Journal of Fixed Income* 19:43–55.

Edmans, A., I. Goldstein, and W. Jiang. 2012. The real effects of financial markets: The impact of prices on takeovers. *The Journal of Finance* 67:933–971.

Edwards, A. K., L. E. Harris, and M. S. Piwowar. 2007. Corporate bond market transaction costs and transparency. *The Journal of Finance* 62:1421–1451.

Ellul, A., C. Jotikasthira, and C. T. Lundblad. 2011. Regulatory pressure and fire sales in the corporate bond market. *Journal of Financial Economics* 101:596–620.

Erel, I., B. Julio, W. Kim, and M. S. Weisbach. 2012. Macroeconomic conditions and

capital raising. *Review of Financial Studies* 25:341–376.

Faulkender, M., and M. A. Petersen. 2006. Does the source of capital affect capital structure? *Review of Financial Studies* 19:45–79.

Feroli, M., A. K. Kashyap, K. L. Schoenholtz, and H. S. Shin. 2014. Market tantrums and monetary policy .

Frank, M. Z., and V. K. Goyal. 2009. Capital structure decisions: which factors are reliably important? *Financial Management* 38:1–37.

Gao, P., and D. Lou. 2013. Cross-market timing in security issuance .

Goldstein, I., H. Jiang, and D. T. Ng. 2017. Investor flows and fragility in corporate bond funds. *Journal of Financial Economics* .

Graham, J. R., and C. R. Harvey. 2001. The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics* 60:187–243.

Jiang, H., D. Li, and A. Wang. 2017. Dynamic liquidity management by corporate bond mutual funds .

Khan, M., L. Kogan, and G. Serafeim. 2012. Mutual fund trading pressure: Firm-level stock price impact and timing of SEOs. *The Journal of Finance* 67:1371–1395.

Kim, W., and M. S. Weisbach. 2008. Motivations for public equity offers: An international perspective. *Journal of Financial Economics* 87:281–307.

Koijen, R. S., and M. Yogo. 2015. The cost of financial frictions for life insurers. *American Economic Review* 105:445–75.

Leary, M. T. 2009. Bank loan supply, lender choice, and corporate capital structure. *The Journal of Finance* 64:1143–1185.

Lemmon, M., and M. R. Roberts. 2010. The Response of Corporate Financing and Investment to Changes in the Supply of Credit. *Journal of Financial and Quantitative Analysis* 45:555–587.

Ma, Y. 2016. Non-financial firms as cross-market arbitrageurs .

Manconi, A., M. Massa, and L. Zhang. 2015. Bondholder concentration and credit

risk: Evidence from a natural experiment. *Review of Finance* 20:127–159.

Massa, M., A. Yasuda, and L. Zhang. 2013. Supply uncertainty of the bond investor base and the leverage of the firm. *Journal of Financial Economics* 110:185–214.

Modigliani, F., and M. H. Miller. 1958. The cost of capital, corporation finance and the theory of investment. *The American Economic Review* pp. 261–297.

Myers, S. C., and N. S. Majluf. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13:187–221.

Nanda, V., W. Wu, and X. Zhou. 2016. Investment Commonality across Insurance Companies: Fire Sale Risk and Corporate Yield Spreads .

Petersen, M. A. 2009. Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies* 22:435–480.

Rauh, J. D., and A. Sufi. 2010. Capital structure and debt structure. *Review of Financial Studies* p. hhq095.

Sirri, E. R., and P. Tufano. 1998. Costly search and mutual fund flows. *The journal of finance* 53:1589–1622.

Spiegel, M., and L. Starks. 2017. Institutional rigidities and bond returns around rating changes. *Working Paper* .

Sufi, A. 2009. The real effects of debt certification: Evidence from the introduction of bank loan ratings. *Review of Financial Studies* 22:1659–1691.

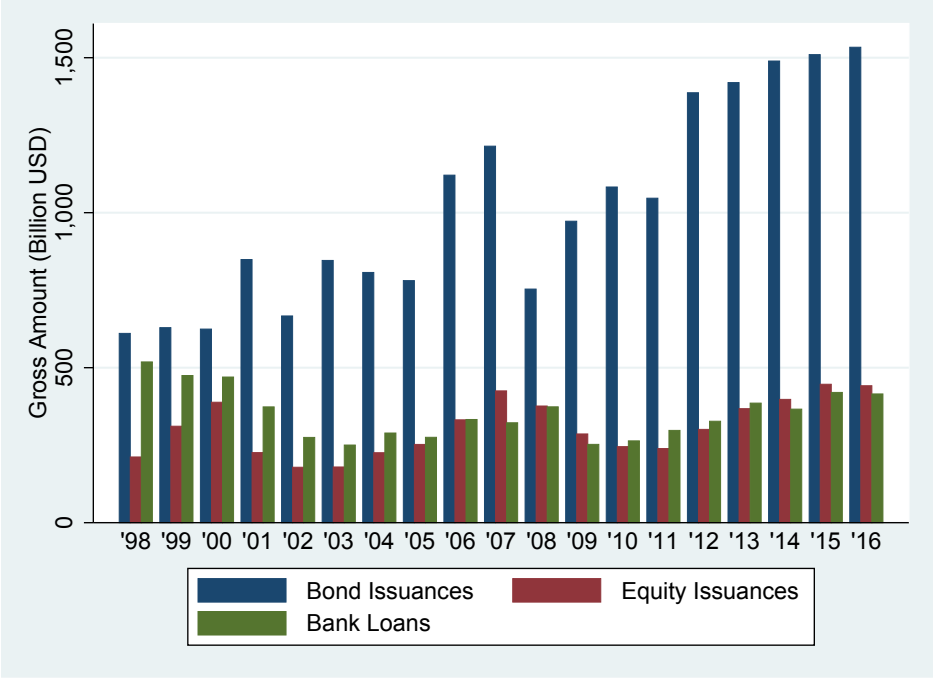
Titman, S. 2002. The Modigliani and Miller theorem and the integration of financial markets. *Financial Management* pp. 101–115.

Titman, S., and R. Wessels. 1988. The determinants of capital structure choice. *The Journal of finance* 43:1–19.

Van Nieuwerburgh, S., and L. Veldkamp. 2010. Information acquisition and under-diversification. *The Review of Economic Studies* 77:779–805.

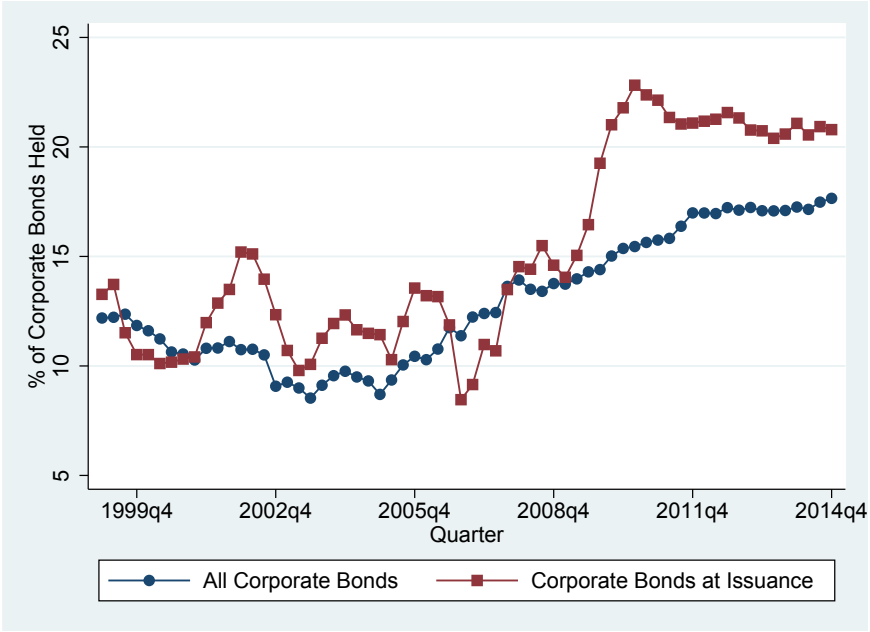
Zeng, Y. 2017. A dynamic theory of mutual fund runs and liquidity management .

Figure 1. Aggregate Sources of Financing for U.S. Non-Financial Firms

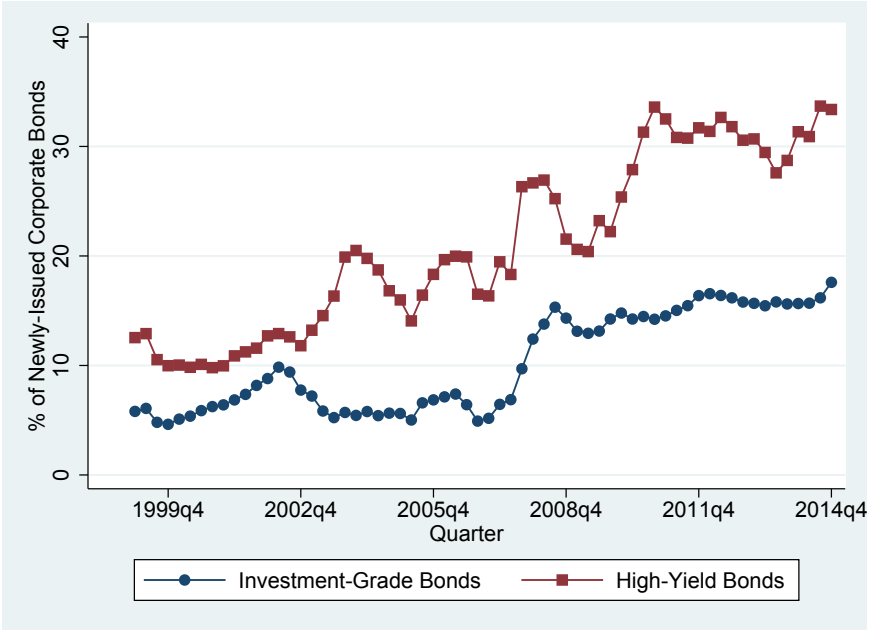


This figure shows the aggregate amount of external financing raised from bond issuance, equity issuance, and commercial and industry loans by U.S. non-financial companies from 1998 to 2016. The amount of equity issuance is gross of share repurchases and merger and acquisitions. Bond issuance data come from SIFMA. Equity issuance data come from *Financial Accounts* by the Federal Reserve Board. Commercial and industry loan data come from the St. Louis Fed.

Figure 2. Mutual Funds' Ownership Share in the Corporate Bond Market



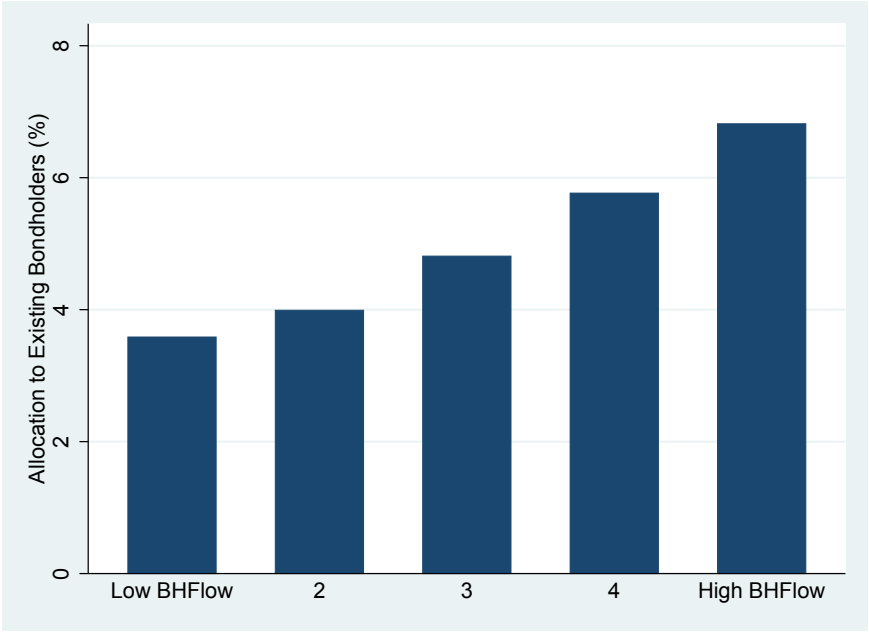
(a) Mutual Fund Overall Ownership Share



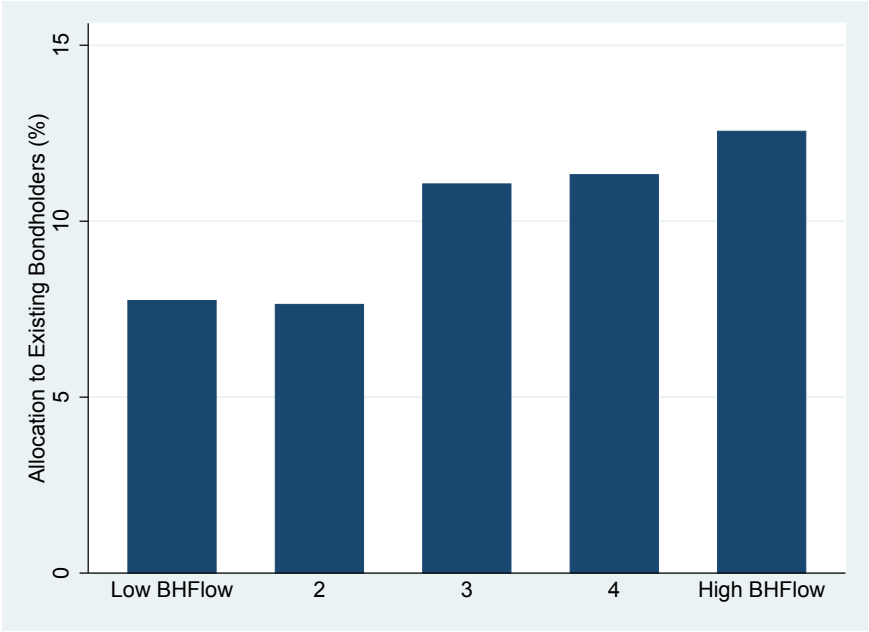
(b) Mutual Fund Ownership Share by Segments

This figure plots the ownership share of mutual funds in corporate bond market. In Panel (a), the blue line represents the ownership share for all outstanding corporate bonds, while the red line represents the ownership share among corporate bonds that are issued within a quarter. In Panel (b), the blue line represents newly-issued investment-grade corporate bonds, while the red line represents newly-issued high-yield corporate bonds

Figure 3. Allocation to Existing Bondholders: Sorted by $BHFlow$



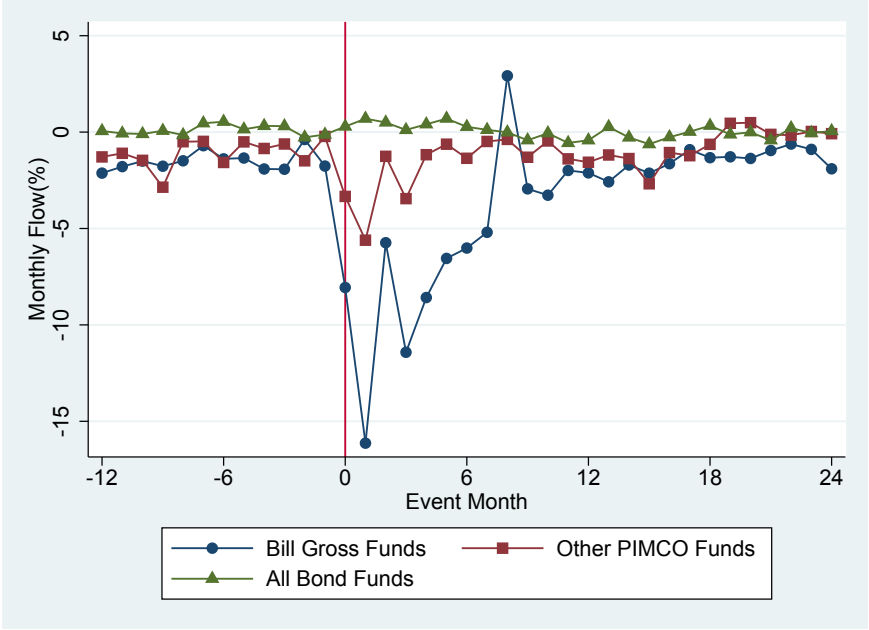
(a) Investment-Grade Issues



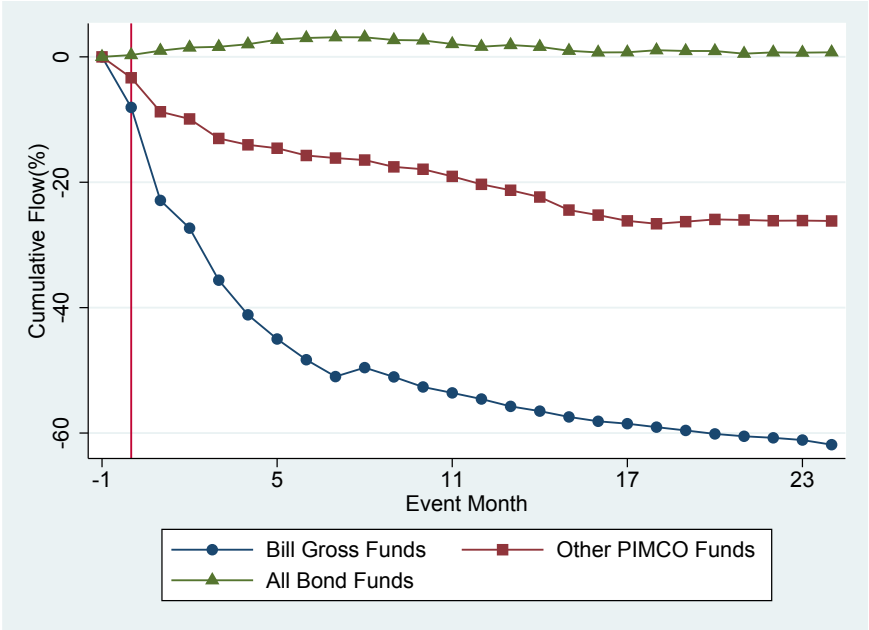
(b) High-Yield Issues

This figure plots the aggregate allocation of new bond issuances to the existing bondholder funds in the Investment-Grade segment (Panel (a)) and the High-Yield segment (Panel (b)). Corporate bond issuances in the sample are sorted into quintile groups based on their $BHFlow$. $BHFlow$ is the aggregate fund flows of an issuer's existing bondholders. The value is calculated quarterly and averaged across four quarters preceding the issuance. Allocation is calculated as the total par value of a bond issue held by a group of mutual funds scaled by total amount offered in the issuance.

Figure 4. PIMCO's Fund Flows After Bill Gross' Departure



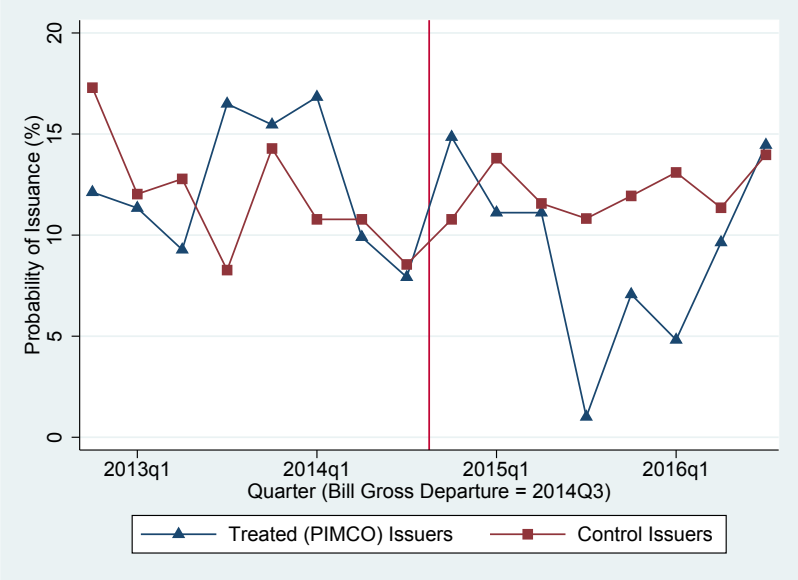
(a) Monthly Flow



(b) Cumulative Flow

This figure shows the fund flows for (a) Bill Gross' Total Return Funds, (b) other funds in the PIMCO fund family, and (c) all bond funds after Bill Gross' departure from PIMCO in September 2014. Panel (a) exhibits monthly flows, and Panel (b) exhibits cumulative flows.

Figure 5. Issuance Probability of Firms in PIMCO Portfolios After Gross' Departure



This figure displays the probability of new bond issuance for treated firms (*PIMCO Issuers*) and control firms. Treated issuers are firms whose outstanding bonds were overweighted PIMCO portfolios at the end of 2014Q3 (when Bill Gross left PIMCO). Control issuers are firms whose bonds were held by Prudential or Vanguard portfolios, the second and third largest bond managers at the time, for more than 3 percent.

Table 1. Mutual Funds' Investment Decisions for Newly-Issued Bonds

Panel A: Extensive Margin			
Dependent Variable: $D(Participation)$			
Sample	All	Rating-matched	Non-Rollover
	(1)	(2)	(3)
D(Bondholder)	0.128***	0.121***	0.136***
	(15.09)	(14.71)	(15.28)
Observations	5,644,426	2,355,298	4,486,992
Adjusted R^2	0.105	0.153	0.104
Bond Issuance FE	Y	Y	Y
Fund * Quarter FE	Y	Y	Y
Panel B: Intensive Margin			
Dependent Variable: $allocation * 100$			
	(1)	(2)	(3)
D(Bondholder)	0.289***	0.221***	0.171***
	(6.62)	(6.87)	(4.22)
Existing Bond Portfolio Weight			0.134***
			(3.41)
Fund Flow		0.314***	0.316***
		(6.45)	(6.48)
D(Bondholder) * Fund Flow		0.264***	0.281***
		(2.80)	(3.08)
Ln(Fund TNA)		0.163***	0.164***
		(13.05)	(13.09)
Observations	159,949	159,949	159,949
Adjusted R^2	0.153	0.352	0.353
Bond Issuance FE	Y	Y	Y
Fund + Quarter FE	Y	Y	Y

This table examines a fund's decision to participate in new bond issuances and its allocation conditional on participation. The observations are at is issue-quarter-fund level. $D(Bondholder)$ is a binary variable indicating if a fund has ownership in the outstanding bonds offered by the same issuer before the issuance quarter. In Column (2) of Panel A, the sample only includes investment-grade issues for investment-grade-focused funds and high-yield issues for high-yield-focused funds. In Columns (3) of Panel A, I exclude bond offerings where the issuer has maturing bonds. In Panel B, "Existing Bond Portfolio Weight" denotes the weight in mutual funds' portfolio of issuer's outstanding bonds. Fund flows are measure over the previous four quarters before the issuance. Standard errors are two-way clustered at the fund and quarter level. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 2. Firm-level Summary Statistics

Panel A: Full Sample						
	N	Average	Std	10th pct	Median	90th pct
$BHFlow$ (%)	52,247	1.70	3.47	-1.32	0.78	6.29
Bond Issuance Dummy	52,247	0.07	0.26	0	0	0
Issuance Amount/Total Assets (%)	52,247	0.66	4.53	0.00	0.00	0.00
Market Capitalization ($million)	52,247	12,099	33,522	265	2,842	26,177
Total Assets ($million)	52,247	11,461	18,763	666	4,006	31,212
Market-to-Book	52,247	1.59	0.84	0.88	1.32	2.67
Book Leverage (%)	52,247	31.40	16.27	10.59	30.68	54.08
Capital Expenditure (%)	52,247	6.33	5.85	1.38	4.51	13.58
R&D Expense (%)	52,247	1.51	3.51	0.00	0.00	4.91
Tangibility (% PP&E/Total Assets)	52,247	66.20	39.98	15.58	63.05	120.88
Return On Assets (%)	52,247	13.67	6.61	6.26	12.80	22.74
Maturing Debt/Total Assets (%)	52,247	3.67	5.85	0.00	1.54	9.54
Issuer Investment-Grade Dummy	52,247	0.39	0.49	0	0	1
Past 12-Month Stock Return (%)	52,247	14.26	38.76	-33.49	14.62	60.78
Past 12-Month Bond Return (%)	52,247	6.61	14.46	-6.23	5.67	19.26
$BHFlow^{res}$ (%)	52,247	0.65	2.38	-0.89	0.38	3.58

Panel B: Sorted by $BHFlow$					
	1(Low)	2	3	4	5(High)
$BHFlow$ (%)	-1.51	0.17	1.22	2.59	5.95
Bond Issuance Dummy	0.07	0.06	0.06	0.07	0.10
Issuance Amount/Total Assets (%)	0.65	0.66	0.62	0.65	0.71
Market Capitalization ($million)	9,574	11,235	10,501	13,024	16,132
Total Assets ($million)	9,481	11,569	10,543	11,286	14,407
Market-to-Book	1.52	1.61	1.63	1.63	1.55
Book Leverage (%)	33.56	29.64	29.15	30.62	34.03
Capital Expenditure (%)	6.40	6.58	6.44	6.19	6.07
R&D Expense (%)	1.21	1.66	1.76	1.57	1.33
Tangibility (% PP&E/Total Assets)	66.08	67.56	66.75	65.66	64.96
Return On Assets (%)	13.36	13.79	13.79	13.95	13.47
Maturing Debt/Total Assets (%)	3.49	3.68	3.57	3.63	3.98
Issuer Investment-Grade Dummy	0.32	0.34	0.36	0.46	0.48
Past 12-Month Stock Return (%)	14.38	14.88	15.19	13.93	12.94
Past 12-Month Bond Return (%)	6.23	6.66	6.70	6.75	6.73
$BHFlow^{res}$(%)	0.14	0.38	0.52	0.88	2.60

This table summarizes bondholder flows and firm characteristics in the main sample. The observations are at the firm-quarter level. $BHFlow$ is defined in Equation 4, and $BHFlow^{res}$ is defined in Equation 6. Both are measured cumulatively over the most recent four quarters. In Panel A the full sample is pooled together. In Panel B, firms are sorted into five group depending on their cross-sectional ranking on $BHFlow$. The sample period spans from 1998 to 2014.

Table 3. Bondholder Flow and Firm Bond Issuance Decisions

Dependent Variable: $D(Issuance_{t+1} > 0)$								
Specification	Linear Probability			Logit	Linear Probability			Logit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$BHFlow$ (standardized)	0.940***	0.883***	0.812***	0.706***				
	(4.90)	(4.94)	(3.84)	(6.17)				
$BHFlow^{res}$ (standardized)					0.656***	0.681***	0.680***	0.655***
					(3.39)	(3.31)	(3.52)	(4.29)
Ln(Equity Capitalization)	2.459***	2.455***	2.459***	2.318***	2.512***	2.510***	2.509***	2.372***
	(10.12)	(10.36)	(10.13)	(20.35)	(10.13)	(10.41)	(10.12)	(25.05)
Market-to-Book	-1.470***	-1.132***	-1.451***	-1.395***	-1.521***	-1.187***	-1.499***	-1.425***
	(-4.99)	(-3.95)	(-4.97)	(-8.17)	(-5.20)	(-4.16)	(-5.17)	(-8.70)
Book Leverage	-0.0899***	-0.0740***	-0.0896***	-0.0924***	-0.0949***	-0.0795***	-0.0944***	-0.0965***
	(-6.60)	(-5.26)	(-6.56)	(-9.51)	(-6.91)	(-5.57)	(-6.87)	(-9.78)
CAPX/Total Assets	0.124***	0.146***	0.123***	0.117***	0.119***	0.142***	0.118***	0.113***
	(3.55)	(3.44)	(3.51)	(4.99)	(3.37)	(3.31)	(3.34)	(4.60)
Asset Tangibility	-0.00373	0.00224	-0.00332	-0.00356	-0.00425	0.00209	-0.00383	-0.00394
	(-0.61)	(0.33)	(-0.54)	(-1.03)	(-0.68)	(0.30)	(-0.61)	(-1.14)
Return on Assets	0.0650**	0.0147	0.0608**	0.0800***	0.0666**	0.0161	0.0623**	0.0836***
	(2.13)	(0.47)	(2.01)	(3.61)	(2.17)	(0.51)	(2.03)	(3.87)
Maturing Debt/Total Assets	0.0900**	0.125***	0.0892**	0.0555***	0.0885**	0.122***	0.0876**	0.0555***
	(2.50)	(3.64)	(2.49)	(3.63)	(2.46)	(3.53)	(2.44)	(3.60)
Issuer Investment Grade	0.733	0.472		0.809***	0.806	0.544		0.884***
	(1.30)	(0.85)		(3.05)	(1.40)	(0.97)		(3.10)
12-Month Issuer Equity Return	0.00375	-0.00105	0.00248	0.00542	0.00363	-0.000979	0.00236	0.00518
	(1.01)	(-0.29)	(0.69)	(1.57)	(0.97)	(-0.27)	(0.66)	(1.49)
12-Month Issuer Bond Return	0.0449**	0.0394**	0.0338**	0.0394***	0.0472**	0.0415**	0.0357**	0.0415***
	(2.30)	(2.04)	(2.11)	(2.72)	(2.43)	(2.16)	(2.24)	(2.84)
Observations	52247	52247	52247	52247	52247	52247	52247	52247
R^2	0.062	0.107	0.065	0.069	0.062	0.106	0.065	0.069
Quarter FE	Y	N/A	N/A	Y	Y	N/A	N/A	Y
Quarter-by-Industry FE	N	Y	N	N	N	Y	N	N
Quarter-by-IG FE	N	N	Y	N	N	N	Y	N

This table presents estimates from Equation (7). The observations are at firm-quarter level. $BHFlow$ is defined in Equation 4, and $BHFlow^{res}$ is defined in Equation 6. Both are measured from Quarter $t-3$ to Quarter t, and are standardized. All firm characteristics are measured at Quarter t. All columns except Columns (4) and (8) use linear probability models. Columns (4) and (8) use logit models, and marginal effects evaluated at mean are shown instead of coefficients. All coefficients are multiplied by 100 to ease interpretation. Standard errors are two-way clustered by issuer and quarter, with the exception of Columns (4) and (8), which are clustered at quarter level. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 4. Bondholder Flow and Bond Offering Yield Spreads

Dependent Variable: Yield Spread (%)	(1)	(2)	(3)	(4)	(5)	(6)
$BHFlow$ (standardized)	-0.0555***	-0.0510***	-0.0443*			
	(-2.92)	(-2.67)	(-1.85)			
$BHFlow^{res}$ (standardized)				-0.0575**	-0.0402*	-0.0310*
				(-2.55)	(-1.94)	(-1.76)
Treasury Yield of Matched Maturity	-0.679***	-0.722***	-0.699***	-0.682***	-0.683***	-0.684***
	(-10.75)	(-11.55)	(-10.73)	(-10.77)	(-10.06)	(-10.46)
Merrill Lynch Index Yield of Matched Credit Rating	0.123***	0.0775		0.121***	0.114**	
	(3.30)	(1.66)		(3.21)	(2.42)	
Ln(Equity Capitalization)	-0.211***	-0.238***	-0.191***	-0.219***	-0.236***	-0.330***
	(-9.22)	(-9.74)	(-9.27)	(-10.04)	(-11.85)	(-13.01)
Ln(Issue Offering Amount)	0.0813***	0.0968***	0.109***	0.0924***	0.104***	0.141***
	(3.06)	(3.74)	(4.02)	(3.84)	(5.31)	(6.90)
Ln(Maturity in Years)	0.268***	0.266***	0.268***	0.271***	0.238***	0.261***
	(4.86)	(4.71)	(4.74)	(5.06)	(3.32)	(4.00)
Book Leverage	-0.000297	0.00402*	0.000789	-0.000514	0.000646	0.00231
	(-0.16)	(1.86)	(0.48)	(-0.28)	(0.33)	(1.06)
Return on Assets	-0.00621	-0.00307	-0.00241	-0.00623	-0.00683*	-0.0129**
	(-1.59)	(-0.60)	(-0.64)	(-1.59)	(-1.80)	(-2.76)
Rule 144A	0.131*	0.119	0.173**	0.132*	0.0987	0.286***
	(1.77)	(1.31)	(2.44)	(1.79)	(1.26)	(4.35)
Credit Rating (numerical)	0.0948***	0.0906***		0.0971***	0.1000***	
	(4.27)	(3.48)		(4.50)	(3.66)	
Below A- Grade	0.0862	0.148		0.0721	0.0306	
	(0.98)	(1.57)		(0.83)	(0.30)	
Below BBB- Grade	0.772***	0.792***		0.748***	0.758***	
	(6.75)	(7.01)		(6.81)	(7.41)	
12-Month Equity Return	-0.477***	-0.468***	-0.442***	-0.465***	-0.450***	-0.361***
	(-6.19)	(-5.71)	(-5.54)	(-6.10)	(-5.75)	(-4.25)
Equity Return Volatility	6.146***	5.905***	4.827***	6.077***	5.532***	7.064***
	(8.51)	(6.46)	(6.61)	(8.49)	(7.27)	(8.30)
12-Month Issuer Bond Return	-0.00728	-0.0103**	0.00320	-0.00673	-0.00774	-0.00370
	(-1.46)	(-2.37)	(0.73)	(-1.36)	(-1.61)	(-0.66)
Observations	5183	5183	5183	5183	5183	5183
R^2	0.650	0.731	0.725	0.650	0.667	0.644
Quarter FE	Y	N/A	N/A	Y	N/A	N/A
Quarter-by-Industry FE	N	Y	N	N	Y	N
Quarter-by-Rating FE	N	N	Y	N	N	Y

This table presents estimates from Equation (8). The observations are at issuance level. The dependent variable, yield spread, is defined as the difference between bond offering yield and the yield of treasury bills with the closest maturity. $BHFlow$ is defined in Equation 4, and $BHFlow^{res}$ is defined in Equation 6. Both are measured from Quarter $t-3$ to Quarter t, and are standardized. *Rule 144A* indicates that the bond issue is privately placed under the SEC Rule 144A. Credit ratings are measured at bond issue level. Standard errors are two-way clustered by both issuer and quarter. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 5. Substitution Effects on Equity Issuances and Bank Loans

Panel A: Equity Issuances						
Dependent Variable:	$D(EquityIssue_{t+1} > 0)$			$EquityIssue_{t+1}/TotalAssets_t(\%)$		
Mean Value:	1.9(%)			0.23(%)		
Specification	Linear Probability			OLS		
	(1)	(2)	(3)	(4)	(5)	(6)
$BHFlow$ (standardized)	-0.132**	-0.132*	-0.137**	-0.0172*	-0.0250**	-0.0177*
	(-2.04)	(-1.95)	(-2.17)	(-1.73)	(-2.22)	(-1.97)
Observations	52247	52247	52247	52247	52247	52247
R^2	0.018	0.086	0.020	0.021	0.081	0.022
Firm-level Controls	Y	Y	Y	Y	Y	Y
Quarter FE	Y	N	N	Y	N	N
Quarter-by-Industry FE	N	Y	N	N	Y	N
Quarter-by-IG FE	N	N	Y	N	N	Y

Panel B: New Term Loans						
Dependent Variable:	$D(NewLoan_{t+1} > 0)$			$NewLoan_{t+1}/TotalAssets_t(\%)$		
Mean Value:	5.8(%)			0.51(%)		
Specification	Linear Probability			OLS		
	(1)	(2)	(3)	(4)	(5)	(6)
$BHFlow$ (standardized)	-0.400*	-0.452*	-0.266	-0.0485**	-0.0525**	-0.0362**
	(-1.80)	(-1.79)	(-1.31)	(-2.41)	(-2.38)	(-2.04)
Observations	17802	17802	17802	17802	17802	17802
R^2	0.032	0.168	0.039	0.035	0.171	0.042
Firm-level Controls	Y	Y	Y	Y	Y	Y
Quarter FE	Y	N	N	Y	N	N
Quarter-by-Industry FE	N	Y	N	N	Y	N
Quarter-by-IG FE	N	N	Y	N	N	Y

This table examines the relation between bondholder flows and equity issuance (Panel A), and bondholder flows and corporate bank loan initiations (Panel B). $BHFlow$ is defined in Equation 4, and measured from Quarter $t-3$ to Quarter t. It is standardized to have zero mean and unit standard deviation. In Panel A, the sample contains all bond-issuing firm-quarters as in Table 3. The dependent variable in Columns (1)-(3) is a dummy indicating if a firm issues equity in Quarter $t+1$. The dependent variable is Columns (4)-(6) is a continuous variables of the amount of equity issuance scaled by total assets. In Panel B, the sample contains firm-quarters where the firm has outstanding bonds and has initiated bank loans during the past five years. The dependent variable is an indicator that the firm has a new term loan initiated at Quarter $t+1$ (Columns (1)-(3)) or a continuous variable of the amount of newly-initiated bank loans (Columns (4)-(6)). Firm-level control variables include Ln(Equity Capitalization), Market-to-Book Ratio, Book Leverage, Asset Tangibility, Return on Assets, CAPX over Total Assets, Issuer Investment-Grade Dummy, 12-month Issuer Equity Returns, and 12-month Issuer Bond Returns. All firm characteristics are measured at Quarter t. The coefficients are multiplied by 100 to ease interpretation. Standard errors are two-way clustered by both issuer and quarter. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 6. Use of Issuance Proceeds: Investments, Cash Holdings, and Payouts

Dependent Variable (%)	$\frac{CAPX_t}{AT_t}$ (1)	$\frac{RnD_t}{AT_t}$ (2)	$\frac{Acquisition_t}{AT_t}$ (3)	$\frac{InvestTotal_t}{AT_t}$ (4)	$\frac{\Delta Cash_t}{AT_t}$ (5)	$\frac{Payout_t}{AT_t}$ (6)
Issuance Amount	0.143***	0.0507***	0.394***	0.585***	0.119***	0.0438
	(4.84)	(4.43)	(8.58)	(14.18)	(4.59)	(1.35)
D(High BHFlow) * Issuance Amount	-0.127**	0.0239*	-0.0786	-0.183***	0.0725	0.0687*
	(-2.54)	(1.91)	(-1.46)	(-2.91)	(1.60)	(1.81)
D(High BHFlow)	0.436	-0.0114	0.572	1.005	-0.413	0.165
	(0.75)	(-0.07)	(1.21)	(1.64)	(-1.30)	(0.32)
Ln(Total Assets)	-0.411**	0.345***	0.104	0.0144	0.115	0.836***
	(-2.29)	(8.80)	(0.62)	(0.07)	(1.09)	(7.97)
Adjusted R^2	0.074	0.024	0.124	0.212	0.042	0.097
Observations	3512	3512	3512	3512	3512	3512
Year FE	Y	Y	Y	Y	Y	Y

This table presents estimates from Equation 11. *Issuance Amount* is the amount of bond issuance at year t scaled by total assets. D(High $BHFlow$) is a dummy variable that equals one if $BHFlow$ in year $t-1$ is in the highest quartile of the issuance sample. The dependent variables in Columns (1)–(3) are capital expenditure, research and development costs, and acquisition costs scaled by total assets. In Column (4), the dependent variable is the total investment, which is the sum of (1) to (3). In Column (5), the dependent variable is the change in cash holdings. In Column (6), the dependent variable is the equity payout, measured by adding cash dividends and equity repurchases. Standard errors are clustered at the year level. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 7. Firm characteristics of PIMCO-treated and control firms

	Treated Firms	Control Firms	$P(Treated = Control)$
Number of Firms	108	278	
Market Capitalization ($ million)	15,721	16,764	0.80
Market-to-Book Ratio	1.65	1.87	0.08
Book Leverage (%)	35.6	33.5	0.32
Capital Expenditure (%)	5.16	5.56	0.53
Asset Tangibility (%)	57.3	58.6	0.78
Return on Assets (%)	12.3	14.0	0.02
D(Investment-Grade Rating)	0.47	0.51	0.23
12-Month Equity Returns (%)	33.39	31.04	0.16
12-Month Bond Returns (%)	10.19	9.76	0.49
Mautring Debt/Total Assets (%)	2.92	2.93	0.99

This table tabulates the issuer characteristics for the treated and control firms in the PIMCO study. I define treatment firms as issuers whose bonds have a weight larger than 3% in PIMCO's portfolios at the end of 2014Q3. The control firms are issuers whose bonds have a weight larger than 3% in Vanguard's or Prudential's portfolios. The last column shows the probability under the null that treated firms and control firms have similar characteristics using t-tests.

Table 8. Bill Gross' Departure from PIMCO: Impact on Firms' Bond Issuances

Dependent Variable:	$Dummy(Issuance_t > 0)$			
	(1)	(2)	(3)	(4)
Firm in PIMCO*Post Gross Departure	-0.0345**	-0.0336*	-0.0331*	-0.0348**
	(-1.98)	(-1.91)	(-1.89)	(-2.05)
Firm in PIMCO	0.00566	0.0235	0.0229	
	(0.34)	(1.52)	(1.49)	
Post Gross Departure	0.00291	-0.0162		
	(0.35)	(-1.44)		
6-Month Treasury Yield		-0.0331		
		(-0.80)		
Treasury 10Y-6M		-0.0235		
		(-1.57)		
Log(Equity Capitalization)		0.0499***	0.0504***	-0.00853
		(8.22)	(8.22)	(-0.46)
Market-to-Book		-0.00686	-0.00338	0.0777***
		(-0.47)	(-0.23)	(2.95)
Book Leverage		-0.00126***	-0.00133***	0.00439***
		(-2.60)	(-2.75)	(4.70)
CAPX/Total Assets		0.00226	0.00251	-0.000387
		(1.38)	(1.52)	(-0.11)
Return over Assets		0.00142	0.000991	0.000378
		(0.95)	(0.65)	(0.18)
Issuer Investment Grade		-0.0167	-0.0165	0.0402
		(-1.19)	(-1.19)	(1.15)
12-Month Equity Return		-0.0000944	0.00000598	-0.000338
		(-0.46)	(0.03)	(-1.41)
12-Month Issuer Bond Return		0.000416	0.000347	0.000682
		(0.66)	(0.43)	(0.85)
Observations	5701	5701	5701	5701
R^2	0.001	0.027	0.031	0.141
Quarter FE	N	N	Y	Y
Issuer FE	N	N	N	Y

This table shows the results from Equation 12. *Firm in PIMCO* is an dummy variable that equals one if a firm's outstanding bonds were overweighted by Pimco's portfolios at the end of 2014Q3. The control group are firms whose outstanding bonds were overweighted by Prudential's or Vanguard's portfolios. *Post Gross Departure* dummy is set to one for quarters between 2014Q4 to 2016Q3, and zero for quarters between 2012Q4 to 2014Q3. The dependent variable is a dummy variable indicating bond issuance at Quarter t. Standard errors are two-way clustered by both issuer and quarter. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 9. Mutual Funds' Investment Decisions for Newly-Issued Bonds: Cross-sectional Variations

Dependent Variable:	$D(Participation)$					$D(UnderRelation)$
	(1)	(2)	(3)	(4)	(5)	(6)
D(Bondholder)	0.0552***	0.116***	0.101***	0.121***	0.120***	0.149***
	(8.11)	(15.06)	(13.27)	(14.40)	(14.79)	(6.35)
* D(High Yield)	0.153***					
	(11.34)					
* D(Shorter Issuance History)		0.0281***				
		(3.75)				
* D(Less Analyst Coverage)			0.0649***			
			(8.54)			
* D(Fewer Previous Bond Trades)				0.0192***		
				(3.06)		
D(UnderRelation)					0.0513***	
					(9.63)	
Observations	5,644,426	5,644,426	5,644,426	5,644,426	5,644,426	5,644,426
Adjusted R^2	0.108	0.105	0.106	0.105	0.107	0.027
Bond Issuance FE	Y	Y	Y	Y	Y	Y
Fund * Quarter FE	Y	Y	Y	Y	Y	Y

This table examines the cross-sectional variation in mutual funds' investment decisions as in Equation 13. The observations are at is issue-quarter-fund level. $D(Participation)$ is set to one is the mutual fund hold positive amount of bond at the end of the bond's issuance quarter. $D(UnderRelation)$ is set to one if a mutual fund has participated in the underwriter's recent bond issuances. $D(Bondholder)$ is a binary variable indicating if a fund has ownership in outstanding bonds offered by the same issuer before the issuance. D(High Yield) is an indicator for high-yield bonds. D(Shorter Issuance History) is an indicator if a firm has a history of issuing bonds that is shorter than the cross-sectional median. D(Less Analyst Coverage) is an indicator if a firm has fewer-than-median number of analysts covering. D(Fewer Previous Bond Trades) is an indicating if a firm's outstanding bonds has fewer-than-median secondary market trading during past quarter. Standard errors are two-way clustered at the fund and quarter level. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 10. Bondholder Flow and Firm Bond Issuance Decisions: Cross-sectional Variations

Dependent Variable: $D(Issuance_{t+1} > 0)$				
	(1)	(2)	(3)	(4)
$BHFlow$ (standardized)	0.678***	0.896***	0.481**	0.444*
	(2.87)	(3.49)	(2.43)	(1.68)
* D(Non-Investment Grade)	0.438*			
	(1.83)			
* D(Shorter Issuance History)		0.121		
		(0.31)		
* D(Less Analyst Coverage)			0.858**	
			(2.60)	
* D(Fewer Previous Bond Trades)				0.750**
				(2.41)
Firm Characteristics	Y	Y	Y	Y
Observations	52247	52247	52247	52247
R^2	0.062	0.062	0.063	0.063
Quarter FE	Y	Y	Y	Y

This table examines the cross-sectional variation in firm bond issuance decisions as in Equation 14. The observation level is firm-quarter. $BHFlow$ is defined in Equation 4, and is measured from Quarter $t-3$ to Quarter t. D(High Yield) is an indicator for high-yield bonds. D(Shorter Issuance History) is an indicator if a firm has a history of issuing bonds that is shorter than the cross-sectional median. D(Less Analyst Coverage) is an indicator if a firm has fewer-than-median number of analysts covering. D(Fewer Previous Bond Trades) is an indicating if a firm's outstanding bonds has fewer-than-median secondary market trading during past quarter. Other firm characteristics are the same as in Table 3, and are suppressed from exposition. The coefficients are multiplied by 100 to ease interpretation. Standard errors are two-way clustered by issuer and quarter. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table A1. Determinants of Bond Mutual Fund Flows

Dependent variable: Quarterly Fund Flows		
Performance sorted by	12-Month Raw Returns	12-Month Alphas
	(1)	(2)
Low Performance Rank	0.145***	0.126***
	(7.68)	(5.49)
Mid Performance Rank	0.0199***	0.0355***
	(3.92)	(7.15)
High Performance Rank	0.177***	0.170***
	(6.81)	(6.19)
Average Category Flow	0.741***	0.742***
	(27.99)	(28.14)
Ln(Lagged TNA)	-0.00278***	-0.00284***
	(-4.05)	(-4.13)
Expense Ratio	-1.323***	-0.856***
	(-3.73)	(-2.66)
Ln(Fund Age)	-0.0381***	-0.0376***
	(-18.57)	(-18.31)
Observations	181408	181408
Adjusted R^2	0.126	0.129
Quarter FE	Y	Y

This table examines the determinants of bond mutual fund flows. The observation is at fund-quarter level. Each quarter, bond funds are ranked by their past 12-month raw returns or alphas and assigned fractional rank $Rank_{i,t-1}$. I then define "low performance rank" as $Min(Rank_{i,t-1}, 0.2)$, "mid performance rank" as $Min(0.6, Rank_{i,t-1} - Low_{i,t-1})$, and "high performance rank" as $Rank_{i,t-1} - Low_{i,t-1} - Mid_{i,t-1}$. "Average Category Flow" is the average flow of funds in the same investment category. Standard errors are two-way clustered at fund and quarter level. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.