# Go with the Flow: Debt Structure Changes and Monetary Policy Transmission*

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**Abstract**

We show that corporate debt structure is strongly influenced by relative flows to fixed income mutual funds and use this new stylized fact to causally identify the floating-rate channel of monetary policy. Higher flows to loan funds relative to bond funds lead to more corporate borrowings of floating-rate loans relative to fixed-rate bonds. This empirical relationship is strong both in the aggregate time series and in the cross section of firms, where we construct firm-specific capital flows based on sticky fund-firm relationship. These flow-induced debt structure changes reflect firms optimally trading off *current* cost of capital savings with deviations from their natural debt structure, which exposes them to *future* interest rate changes. Indeed, firms with more floating-rate debt due to higher loan flows or lower bond flows ex ante are more exposed to ex post interest rate hikes, investing less real capital and experiencing lower stock returns. Using fund flows as an instrument to address the endogeneity of debt structure, we identify a much bigger effect of the floating-rate channel of monetary policy than previously suggested by the literature.

Keywords: mutual fund flows, corporate debt structure, firm investment, interest rate exposure, monetary policy transmission

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# 1 Introduction

There is growing evidence on the importance of debt structure for firm behavior, particularly during periods of active monetary policy. During the recent monetary tightening cycle, for example, when short-term interest rates rose from near zero in 2021 to over 5% in 2023, a firm fully funded with floating-rate debt would see its interest expense rise substantially more than a firm fully funded with fixed-rate debt. In comparison to the large literature on the choice of debt versus equity, there is still limited understanding of the determinants, or the causal implications, of corporate debt structure.[1] In this paper, we establish that the relative flows to fixed income mutual funds are a key determinant of the choice between fixed- and floating-rate debt. We then use this new stylized fact to causally identify the effects of debt structure on the transmission of monetary policy.

We study U.S. publicly-traded speculative-grade firms as a laboratory, since these firms actively borrow both floating-rate loans and fixed-rate bonds. This funding variability gives us the statistical power to cleanly separate the effect of debt structure from the effect of capital structure. We also exploit the recent rise of fixed income mutual funds and ETFs, which have become particularly important corporate lenders after the 2008 financial crisis. Fixed income mutual funds report granular data on their security-level holdings and monthly investor flows, which enable us to construct granular firm-level measures of credit supply shocks. We use these supply shocks to create exogenous variation in firms' exposure to interest rates and examine the transmission of monetary policy to firm investment and stock returns.

We start by showing a very strong time series correlation between the aggregate flows into

[1] There is a large literature on corporate debt maturity, including BARCLAY and SMITH JR. (1995); Baker et al. (2003); Greenwood et al. (2010); Erel et al. (2011); Badoer and James (2016); Xu (2017); Choi et al. (2018); Chen et al. (2021); Bai et al. (2022), mostly focusing on rollover risk. In comparison, there is limited research on the choice between floating-rate loans vs fixed-rate bonds, which is the focus of this paper.

loans funds, relative to bond funds, and the aggregate issuance of loans as opposed to bonds. During periods when loan funds experience higher inflows than bond funds, such as the few years during the late 2010s when loan returns outperformed bond returns, firms are much more likely to issue loans than bonds. In a horse-race comparing fund flows with other macroeconomic aggregates, we find that fund flows have a higher marginal impact than any other variable we examine, including GDP growth, Treasury yields, credit spreads, and Treasury issuance, which others such as Greenwood et al. (2010) and Chen et al. (2021) have shown are important determinants of corporate debt maturity choices. Since loans nearly always pay a floating-rate and bonds nearly always pay a fixed-rate, relative fund flows can impact the subsequent debt structure of firms and their exposure to changes in interest rates.

We then construct a *firm-specific* measure of the relative supply of bonds and loans. Our measure rests on the fact that funds tend to form relationships with the firms in their portfolios (Zhu, 2021), which creates two important behaviors. First, funds tend to hold relatively concentrated portfolios of investments, on average only around 10% to 20% of the universe of outstanding issuers. Second, funds near-proportionally scale their existing investments in response to flows. According to our estimates, a 1% inflow into a loan fund (bond fund) leads, on average, to an increase in holdings of 0.57% (0.69%) in loans (bonds) issued by firms that are already held by the fund. We obtain similar sensitivities for outflows. Based on these behaviors, we construct firm-specific measures of bond flows and loan flows, which, intuitively, capture the amount of buying or selling from the firm's existing debt holders if the funds perfectly proportionally scale up or down their portfolios in response to inflows or outflows.

We show that our measures of loan and bond supply are economically and statistically significant determinants of debt structure choices in the *cross section* of speculative-grade firms. If, for example, a firm's existing loan investors experience inflows, the firm becomes more likely to issue a floating-rate loan, as opposed to a fixed-rate bond, and the share of the firm's outstanding debt that is floating-rate will increase. The effects are similar for outflows and for inflows/outflows to a firm's bond investors. We include a host of control variables in the regressions and continue to find similar coefficient estimates. In our strictest specification, we include granular rating-time and industry-time fixed effects, which effectively narrows our comparison to firms with the same credit rating and industry at the same time and with similar characteristics, and we continue to find similar coefficient estimates.

We provide evidence that the relationship between fund flows and debt structure changes reflects firms taking advantage of relative capital supply to lower their cost of capital. Higher loan flows (bond flows) are associated with lower offering spreads on new issuances of loans (bonds), in the cross section of firms. The fact that price (borrowing costs) and quantity (borrowing amount) move in the opposite direction further confirms that our fund-flow measure captures changes in credit supply rather than changes in firm demand. The pricing and issuance results together suggest that firms optimally cater to the funds receiving inflows at the cost of deviating from their natural debt structures, which expose them to future risks.

We next show that flow-induced debt structure changes create unhedged exposure to subsequent changes in interest rates. In response to interest rate hikes (e.g. during 2022-23), firms with more floating-rate debt – due to ex-ante loan inflows or bond outflows – invest significantly less in real capital. Our estimates show that, compared with an average firm, a firm with 1 p.p. higher loan flow (bond flow) during the previous two years will reduce (increase) capital expenditures by 0.66% (0.23%) of total assets in response to a 1 p.p. increase in the federal funds rate. The results are consistent with prior findings that high-risk firms have limited ability to hedge interest rate exposure with derivatives due to counterparty risks (Cenedese et al., 2020).

We next use our capital supply measures to create an instrument for firms' floating-rate ratios to provide a causal identification of the floating-rate channel of monetary policy (Ippolito et al., 2018; Gürkaynak et al., 2022; Jungherr et al., 2022). Prior literature examining this question has used observed debt structures, which are likely endogenously chosen by the firm to *offset* exposure to interest rates arising from other parts of the firm's operations. In comparison, our flow-induced debt structure changes are likely orthogonal to these other considerations and capture real *net* interest rate exposure. Indeed, our results using fund flows as an instrument suggest that the effect of floating-rate debt on investment sensitivity to interest rate is more than 10 times larger than OLS estimates.

To understand the large magnitude of our estimates, we further investigate the mechanisms through which floating-rate debt affects firm investment sensitivity to interest rate. We find that most of the change in investment reflects new debt issuance, with firms having a larger floating-rate ratio issuing less new debt. This finding is consistent with the models of the financial accelerator, where increases in interest expenses on *existing* floating-rate debt weaken the firm's balance sheet and amplify the frictions on *new* debt issuance (Bernanke and Gertler, 1995). The results are also consistent with firms actively managing their interest coverage ratio, where increases in the interest expense on existing debt mechanically crowds out new debt issuance (Greenwald, 2019).

We corroborate our conclusions using an event study of stock returns around FOMC announcements. This high-frequency analysis, while making strong assumptions on the efficiency of the stock market, provides an independent check using investors' assessment of the impact of changes in monetary policy on firms' valuation. We find that, for firms with more floating-rate debt due to higher loan flows or lower bond flows, their stock prices are much more sensitive to interest rate surprises during the two-days around FOMC announcements. By instrumenting for firms' floating-rate ratios using fund flows, we show that firms with more floating-rate debt experience worse stock returns in response to positive monetary policy surprises. The estimated effects are again much larger than the OLS estimates, confirming that the structure of a firm's debt, identified with the proper instrument, can have a large effect on the firm's response to monetary policy.

## 1.1 Literature

Our results contribute to three strands of the existing literature. First, the results provide more insight into the determinants of corporate debt structure. Existing papers typically focus on aggregate time series of debt maturity and the role of rollover risk (BARCLAY and SMITH JR., 1995; Baker et al., 2003; Greenwood et al., 2010; Erel et al., 2011; Badoer and James, 2016; Xu, 2017; Choi et al., 2018; Chen et al., 2021; Bai et al., 2022). In comparison, we focus on the cross section of firms' choices between floating-rate loans and fixed-rate bonds and establish the relative supply of loans and bonds as a leading determinant. Most related to our paper is Becker and Ivashina (2014), who also study the choice between bonds and loans. Compared to their focus on *aggregate* bank credit supply, we construct *firm-specific* credit supply that allows us to filter out confounding effects in the time series.

Second, we contribute to the growing literature highlighting the impact of fund flows on corporate financing decisions (Zhu, 2021; Fang, 2023; Emin et al., 2021). Building on this literature, we show that the relative flows into loan and bond funds directly affect the type of debt that firms issue. More importantly, we show *indirect* effects, as flow-induced changes in issuance decisions can in turn affect firms' real investment due to interest rate exposure.

Lastly, our paper provides causal identification on the effect of corporate debt structure on monetary policy transmission (Ippolito et al., 2018; Gürkaynak et al., 2022; Jungherr et al., 2022). Existing literature focuses on raw observed debt structure, which can be endogenously chosen by the firm – for example, to offset its asset-side cash flow sensitivity to interest rate. As a result, this endogeneity can lead to downward bias in OLS estimates. In contrast, we instrument debt structure changes with fund flows, which are more likely to be shocks to interest rate exposure that are orthogonal to interest rate exposure on other parts of firms' balance sheets. Our estimates using fund flows as instruments suggest that debt structure has much larger real effects than previously suggested by the literature.

# 2 Background and Data

## 2.1 Corporate Borrowing of Bonds and Loans

Bonds and loans are the two main types of debt used by non-financial corporations. Bonds tend to be fixed-rate and unsecured, whereas loans tend to be floating-rate and secured (Nini and Smith, 2024). Figure A1 shows that, on average, 98% (77%) of loan issuances are floating-rate (secured), whereas the number is 4% (19%) for bond issuances. There are many institutional reasons for these conventional differences between bonds and loans. For example, banks have traditionally been the largest investors of loans and they prefer floating-rate debt that match with the floating-rate interests paid on deposits (Supera, 2021). Similarly, insurance companies have traditionally been one of the largest investors of corporate bonds, and they prefer long-term fixed-rate debt that match with the fixed payments on long-term life insurance policies and annuities.

We focus on a sample of firms that borrow both floating-rate loans and fixed-rate bonds: public-traded U.S. firms with a speculative-grade credit rating. It is relatively easy for these firms to access the bond market, due to the presence of credit rating and the amount of disclosure that they provide as public companies. At the same time, loan capital is still important to these firms, since the majority of bond investors such as insurance companies face mandates or regulations against non-investment-grade holdings, which limit the total amount of bond capital to speculative-grade firms. Figure A1 shows that speculative-grade firms on average borrow both bonds and loans, with the ratio hovering around 3:1. In contrast, investment-grade firms barely borrow any loans, and non-rated firms borrow little in bonds, potentially due to lack of access.

These speculative-grade firms are economically important. Figure A1 shows that they account for about $300 billion of annual capital expenditure and 10 million of employment.

More importantly, we think of these firms as a unique laboratory to study the effect of debt structure, which applies broadly to all firms. For firms that only issue bonds or loans, debt structure is collinear with capital structure, which makes it difficult to separate the two. For example, when one compares two firms with different amount of floating-rate debt, the difference in their sensitivity to interest rate hikes could be due to difference in leverage (Ottonello and Winberry, 2020), rather than difference in interest expenses. In contrast, for these speculative-grade firms, there is large variability in the use of fixed-rate bonds vs floating-rate loans, which enables us to isolate the effect of debt structure while controlling for leverage.

## 2.2 Bond Funds and Loan Funds

Fixed income mutual funds and ETFs have become one of the largest investors of corporate debt. Figure A2 shows that there has been tremendous growth in fixed income funds, particularly when bank regulations became more stringent after the 2008 financial crisis (Ma et al., 2022). Mutual funds directly provide capital to firms in the primary market of corporate bonds (Zhu, 2021) or syndicated loans (Kundu, 2023).

Most funds have a clear mandate that restricts the type of debt that the fund can purchase. For example, BlackRock High Yield Fund states in its prospectus that: "Invests primarily in non-investment grade bonds with maturities of 10 years or less." As another example, the prospectus of Invesco Senior Floating Rate Fund states that: "This world-class bank loan fund targets floating-rate, high yield returns by investing in the senior secured debt of large companies."

We classify bond funds and loan funds based their actual holdings. We first calculate, for each fund in each period, the fraction of its corporate debt holdings that are bonds or loans. We then classify a fund as bond (loan) fund if the median value of its bond (loan) fraction over time is above 75%. We exclude funds whose stated primary investment focus is government bonds, municipal bonds, or mortgage loans (e.g. Fidelity Real Estate High Income Fund).

### 2.3 Data

Data on mutual funds and ETFs come from CRSP and Morningstar. We include both mutual funds and ETFs as they are similar in terms of investor flows and style-driven investment strategies. We include U.S. fixed income funds as well as funds domiciled in Ireland and Luxembourg that specialize in U.S. fixed income assets. We include foreign funds because they hold 10-20% of U.S. corporate debt, as shown in Panel C of Figure A1. The CRSP holdings data covers U.S. funds and starts in 2010. For foreign funds and for U.S. funds with missing holdings, we manually download their holdings from Morningstar Direct.

To calculate a measure of firm-specific credit supply, we need to map holdings of bonds and loans to firms. To map bonds to firms, we rely on bond CUSIPs and the CUSIP-Compustat link developed by Fang (2023). Loans generally do not have CUSIPs, so we map them to firms using the borrower's name and a fuzzy matching algorithm similar to Chave and Roberts (2008). Specifically, we form a list of source names using the holding positions of mutual funds and a list of target names from Compustat firms and partition each name into a bag of words, excluding uninformative words such as "Inc" or "The". For each name in the source list, we find the name in the target list that has the highest overlap in number of words and manually remove an obvious false matches.

We use accounting data on U.S. non-financial firms from Compustat. We exclude financial firms (SIC code starting with 6). As discussed above, we focus on speculative-grade firms, which rely non-trivially on both fixed-rate bonds and floating-rate loans. We further filter out firms that have never issued a bond or never issued a loan during our sample period. This leaves us with a total of 1,173 firms, and summary statistics of their characteristics are given in Table 1.

Data on firms' debt structure come from Capital IQ, which is based on debt information reported in 10K, 10Q and other SEC filings. We supplement this data with detailed bond-level data from FISD and Refinitiv. Specifically, we substitute the bond information in Capital IQ with our detailed bond-level data. We leave information on other debt (e.g. term loans) intact. We make this alteration because firms sometimes report limited information about their outstanding bonds.[2] When measuring floating-rate debt, we include fixed-rate debt maturing in one year or less, as they will soon be repriced similarly to floating-rate debt (Jungherr et al., 2022).

We also use data on issuances of new debt. Data on newly issued bonds come from Mergent FISD, and data on loan issuance are from DealScan.

# 3 Fund Flows and Debt Structure Changes

## 3.1 Aggregate Evidence

We start by visually examining the aggregate time series in Figure 1. The blue bars show year-over-year net flows to loan funds relative to bond funds.[3] In Panel A, the red line plots the fraction of year-over-year new debt issuances that are loans. There is a strong positive correlation (0.62) between relative loan vs bond fund flows and aggregate issuances of loans relative to bonds. When there are more inflows (outflows) to loan funds or more outflows (inflows) to bond funds, firms issue more loans relative to bonds.

In Panel B, which shows quarterly rather than monthly values, we add year-over-year changes

[2] For example, Apple's 2019 10K lumps all the bonds together and gives a maturity range from 2022 to 2049 – a maturity difference of 27 years. Moreover, some companies report bonds as "Other Borrowings".

[3] Figure A2 shows that both loan fund flows and bond fund flows are important in driving their difference.

in the fraction of outstanding debt that is: 1) loans, 2) fixed rate, or 3) secured. The level changes follow similar trajectories as new issuances and are similarly strongly correlated with relative loan vs bond fund flows. The advantage of using changes in levels is that levels capture not only in new issuances but also retirements of existing debt. For example, firms might respond to bond fund outflows by letting bonds mature, which would lead to a larger fraction of existing debt being loans.

What drives the aggregate flows into and out of loan funds and bond funds? Existing literature shows that mutual fund investors chase returns (e.g. Ben-David et al., 2021) and that monetary policy cycles are an important determinant of fund flows through this return-chasing channel (Brooks et al., 2018; Fang, 2023; Cetorelli et al., 2023). During monetary easing (tightening), long-duration bonds increase (decrease) in value whereas the floating-part of loan returns mechanically decrease (increase), and as a result return-chasing investors flow into bond funds (loan funds). Figure A2 shows consistent evidence in support of this view.

To ensure that the aggregate co-movement between relative loan and bond fund flows and debt structure changes are not spuriously driven by other variables, we run the following multivariate regression using quarterly aggregate time series:

$$Y_t = \alpha + \beta(L1.LoanFundFlow_t - L1.BondFundFlow_t) + \gamma Controls + \epsilon_t \qquad (1)$$

$Y_t$ denotes share of loans in new debt issuances during year $t$ or the year-over-year change in the structure of existing debt. The main regressor is the difference in year-over-year loan fund flows versus bond fund flows, lagged by one quarter. For controls, we include the annual amount of Treasury bond issuance to account for the well-established gap-filling channel for bond issuance (Greenwood et al., 2010; Badoer and James, 2016), changes in risk-free interest rates and credit spreads, and several macroeconomic variables, including GDP growth and

CPI inflation. All variables are scaled to have unit standard deviation, so the regression can be easily interpreted as a horse race among the regressors.

The results are shown in Table 2 and confirm that, even when we include a large set of controls, relative flows to loan funds versus bond funds still has a large effect on aggregate corporate debt choices, both in terms of new issuance of loans and bonds and in terms of changes in the outstanding stock of loans and bonds. Relative loan versus bond fund flows has a large and statistically significant effect on both dependent variables and wins the horse race against other variables in explaining corporate debt structure. Based on the estimated coefficients, relative fund flows has a larger effect on corporate debt structure than all other variables, including changes in government debt maturity, which is the main measure of the gap-filling theory (Greenwood et al., 2010).

## 3.2 Firm-Specific Capital Flows

Despite the very strong time series correlation, we are reluctant to draw a causal interpretation through just the aggregate evidence. Although we include a large set of controls, it is certainly plausible that some latent macroeconomic variables drive the simultaneous movement of fund flows and debt structure changes. In this subsection, we exploit firm-specific capital flows and examine cross-sectional differences in debt structure choices to bolster the evidence that the relative supply of bonds and loans affects corporate debt choices.

Our firm-specific measure of the relative supply of capital relies on the fact that portfolio investments by fixed income funds are "sticky." This fact follows from two features of the behavior of portfolio managers. First, funds tend to hold relatively concentrated portfolios. At year-end 2015, for example, there were 729 non-financial speculative-grade firms with at least $10 million in debt outstanding. The median bond fund, however, held the bonds from only 92 firms, and the median loan fund held loans from only 70 firms.

Second, funds develop relationships with underwriters and borrowers (Zhu, 2021; Barbosa and Ozdagli, 2022), so to a first-approximation, funds respond to inflows or outflows by nearly proportionally scaling their existing holdings. We confirm this behavior by running the following regression:

$$NetPurchase_{i,t,t+4} = \alpha + \beta FundFlow_{i,t,t+4} + \epsilon_{i,t,t+4} \quad (2)$$

where $NetPurchase_{i,t,t+4}$ denotes fund $i$'s net purchases of corporate debt, either in total or just the issuers who are already in the fund's portfolio, which we label portolio debt. Net purchases are the difference in holdings between quarter-end $t$ -and quarter-end $t+4$, scaled by total corporate debt outstanding at quarter-end $t$. The relevant independent variable is $FundFlow_{i,t,t+4}$, which denotes fund $i$'s net flows from quarter-end $t$ to $t+4$, scaled by total net assets at quarter-end $t$. We separate fund inflows ($FundFlow > 0\%$) and fund outflows ($FundFlow < 0\%$). We separately examine bonds funds and loan funds and examine net purchases of bonds and loans separately.

Table 3 confirms that fixed income funds near-proportionally scale up existing holdings in response to flows. Panel A shows that, for the average bond fund, a 1% inflow leads to an increase in bond holdings by 0.92%, and 75% (0.69 / 0.92) of the net purchases come from portfolio bonds, i.e. bonds whose issuers are already held by the fund. Outflows lead to a similar scaling down of portfolio bonds. Columns 3 and 4 show that the average bond fund's loan holdings are much less sensitive, largely because bond funds do not hold many loans.

Panel B shows a similar pattern applies to loan funds. For the average loan fund, in response to 1% inflow (outflow), its loan holdings increase (decrease) by 0.84% (0.79%), and 69% (0.57 / 0.84) of the purchases (70% (0.55 / 0.79) of the sales) come from loans whose issuers are already held by the fund. In contrast, the average loan fund's bond holdings change very little.

The behavior of funds suggests that variation in flows across funds will lead to differential access to capital across firms. Following Zhu (2021), we create a measure of credit supply for firm $j$ arising from fund flows from $t$ to $t+h$ by:

$$LoanFlow_{j,t,t+h}|BondFlow_{j,t,t+h} = \sum_{i \in L|i \in B} \frac{DebtHeld_{i,j,t}}{DebtOutstanding_{j,t}} FundFlow_{i,t,t+h} \qquad (3)$$

where $i \in L$ and $i \in B$ denote, respectively, the set of loan funds and the set of bond funds, $DebtHeld_{i,j,t}$ amount of firm $j$'s debt held by fund $i$ at time $t$, $DebtOutstanding_{j,t}$ firm $j$'s total debt outstanding, $FlowFlow_{i,t,t+h}$ ratio of fund $i$'s flows from time $t$ to $t+h$ to its size. Intuitively, this measure captures the amount of buying or selling by the firm's loan fund holders or bond fund holders (relative to the firm's total debt outstanding) if the funds proportionally scale up or down their portfolios in response to inflows or outflows.

We argue that these firm-specific capital flows can be treated as exogenous shocks to credit supply, akin to the canonical shift-share instrument (Goldsmith-Pinkham et al., 2020). In the canonical shift-share setting, geographically diverse counties have differential exposure to industries (the share) that face imperfectly correlated supply shocks (the shift). Ex-ante variation in exposure to the industries can generate exogenous county-level supply shocks. In our setting, existing relationships create variation across firms in their exposure to different mutual funds (the share) who face imperfectly correlated flows (the shift). Flows to a fund disproportionately affect the firms that have higher ex-ante exposure to that fund. In Section 4, we will formalize the use of these firm-specific capital flows as instruments for debt structure changes.

### 3.3 Firm-Level Debt Structure Changes

We run the following regression on the panel of speculative-grade firms from 2010Q1 to 2023Q4:

$$Y_{j,t,t+4} = \beta_1 LoanFlow_{j,t,t+4} + \beta_2 BondFlow_{j,t,t+4} + \gamma Controls + FE + \epsilon_{j,t,t+4} \quad (4)$$

$Y_{j,t,t+4}$ denotes the change in firm $j$'s debt structure from quarter $t$ to $t+4$. $LoanFlow_{j,t,t+4}$ and $BondFlow_{j,t,t+4}$ are firm-specific capital flows from loan funds and bond funds defined in the previous subsection. Controls include log total assets, cash ratio, Tobin's Q, leverage, and profitability (see Appendix C for variable definitions). Standard errors are two-way clustered by firm and by quarter.

We include firm fixed effects to purge persistent differences between firms in the tendency to issue loans versus bonds, and we include quarter fixed effects to control for aggregate cyclicality. In the most stringent specification, we include rating- by-quarter fixed effects and Fama-French 12 industry-by-quarter fixed effects, so effectively we compare firms with the same rating and in the same industry at the same time.

Table 4 shows the results. In Panel A, the dependent variable is new debt issuance, so we restrict the sample to firm-quarters with positive debt issuance during the year. The results show that both loan flows and bond flows are important determinants of the choice between issuing a loan or issuing a bond, regardless of the specification. In Column 5, where we compare firms with the same rating and in the same industry at the same time, 1 percentage point higher loan flows (bond flows) is associated with 1.72 p.p. higher (2.20 p.p. lower) fraction of loans. This effect is statistically significant at the 1% level and economically meaningful in representing around 5% of the variable's standard deviation (46.18).

Panel B focuses on the change in debt outstanding and shows a similar result. Column

1 shows that 1 p.p. higher loan flow (bond flow) is associated with 0.69 p.p. higher (1.09 p.p. lower) fraction of loans in total debt, which is both statistically significant at 1% level and economically meaningful at around 5% of the variable's standard deviation (17.26). As loans and bonds tend to have different characteristics, these loan flows and bond flows lead to large changes in firms' interest rate and security structure. Columns 2 and 4 show that a 1 p.p. higher loan flow (bond flow) is associated with 0.85% higher (0.86% lower) floating-rate ratio and 0.53% higher (0.76% lower) ratio of secured debt. These effects are all highly statistically significant and economically meaningful in magnitude.

#### 3.3.1 Evidence from Pricing

We find consistent evidence from the pricing of bonds and loans at issuance. Specifically, we run the following regression separately on a sample of loans and on a sample of bonds at their issuances:

$$OfferingSpread_n = LoanFlow_{i,t-4,t} + BondFlow_{i,t-4,t} + \gamma Controls + FE + \epsilon_n$$

$OfferingSpread_n$ is spread over LIBOR for loans and spread over duration-matched Treasury bond yield for bonds. $LoanFlow_{i,t-4,t}$ and $BondFlow_{i,t-4,t}$ are, respectively, issuer $i$'s capital flows from loan funds and bonds funds during the one year prior to the issuance date $t$. Controls include loan or bond characteristics (years to maturity, log amount) and issuer characteristics (credit rating, log total assets, cash ratio, Tobin's Q, leverage, profitability). $FE$ includes firm fixed effects and rating letter by quarter fixed effects.

Table 5 shows the results. Column 1 shows that, across the sample of loans, the ones whose issuers have recently experienced larger loan flows are issued at lower spreads. Similarly, Column 2 shows that, across the sample of bonds, the ones whose issuers have recently experienced larger bond flows are issued at lower spreads. Importantly, loan flows do not have large effects on bond offering spreads, and neither do bond flows on loan offering spreads. This confirms our hypothesis that higher loan flows lead to more issuances of loans relative to bonds because of lower cost of loan capital relative to bond capital. The results here are consistent with those in Zhu (2021). Chaudhary et al. (2022), Fang (2023), and Emin et al. (2021) show similar findings using secondary market prices.

These pricing results corroborate our findings in two important ways. First, one alternative explanation of our debt structure results is that it is driven by firm demand instead of investor supply. Specifically, a firm may demand for more loans relative to bonds (e.g. to hedge the increase in interest sensitivity on its asset side), this demand reverse-leads to higher flows to its loan fund holders. If this were the case, then we should observe an *increase* in the firm's loan spread. The fact that we find the opposite – that the firm's loan borrowing increases while its loan spread decreases – reassures that the behaviors are more likely driven by investor supply rather than firm demand.

The pricing results also support the interpretation of flow-induced debt structure changes as firms' making rational optimizing decisions. Fund flows lead to fluctuations in the relative costs of loans versus bonds. Firms optimally tilt towards (away from) floating-rate loans when flows lead to lower (higher) costs for these instruments relative to fixed-rate bonds. These flow-induced debt structure changes are certainly not cost-free, as they represent deviations from the firms' natural debt structure, which can represent risk exposure (e.g. to interest rate changes), as we are going to elaborate in the next section. However, an optimizing firm would still respond with adjustment to its debt structure, balancing the trade-off between *immediate* cost of capital savings and exposure to *future* risks due to deviations from its natural debt structure.

# 4 Flow-Induced Debt Structure Changes and Monetary Policy Transmission

Do flow-induced debt structure changes have real effects on corporate investment? All else equal, firms borrow more in floating-rate (fixed-rate) debt should be more exposed to changes in monetary policy rates (Ippolito et al., 2018; Gürkaynak et al., 2022; Jungherr et al., 2022). The recent interest rate hike serves as a nice illustration of the mechanism. During one and a half years starting in early 2022, to combat high inflation, the Federal Reserve raised the target for the federal funds rate from near zero to over 5.25 percent. As a result, a firm with 100% floating-rate debt would see its interest expenses increase substantially more than a firm with 100% fixed-rate debt, at least until the firm with fixed-rate debt has to refinance.

There are reasons why flows may affect debt structure but have little effect on real investment. Firms may, for example, change their hedging behavior to undo the impact of changes in the split between fixed- and floating-rate debt. If firms simultaneously issue more floating-rate loans and enter into more floating-to-fixed interest rate swaps, fund flows may not lead to any real effect. At the same time, it can be costly to hedge, especially for low-credit-worthy firms (Cenedese et al., 2020).

We ask whether firms that have experienced larger loan inflows or bond outflows – who are more likely to have increased their reliance on floating-rate debt – are more exposed to *subsequent* changes in interest rates. For illustration, we first examine responses to the recent 2022-23 interest rate hike in the *cross section* of speculative-grade firms:

$$Y_j = \beta_1 LoanFlow_j + \beta_2 BondFlow_j + \gamma Controls + FE + \epsilon_j \tag{5}$$

$Y_j$ denotes firm $j$'s capital expenditures during the eight quarters from 2022Q1 to 2023Q4, as a ratio to the firm's total assets at year-end 2021. $LoanFlow_j$ and $BondFlow_j$ denote loan flows and bond flows during the two years *prior* to the rate hike, from 2020Q1 to 2021Q4. By using loan flows preceding the rate hike, we are asking whether shocks to the supply of capital have a lasting impact on firms by changing their exposure to interest rates. In the regression, we control for log total assets, cash ratio, Tobin's Q and leverage measured at year-end 2021 and contemporaneous profitability measured over the same window as investment (from 2022 to 2023). We include rating letter fixed effects and Fama-French 12 industry fixed effects to compare firms with the same rating in the same industry. These variables help control for investment opportunities and other factors that might affect investment during 2022-23.

The results are shown in Panel A of Table 6, Column 1. The estimate of $\beta_1$ is significantly negative, meaning that firms with larger flows to their loan funds prior to the rate hike (from 2020 to 2021) invested less during the rate hike (from 2022 to 2023). Similarly, the estimate of $\beta_2$ is significantly positive, meaning that firms with larger prior bond fund flows subsequently invested more. The estimated effects are sizable. A 1-percentage-point increase in loan (bond) flows prior to the rate hike is associated with lower (higher) capital expenditure during the rate hike of 2.20% (1.34%) of total assets. From 2022 to 2023, the mean of capital expenditure as ratio of total assets is 13.91% and the standard deviation is 15.64%, so the estimated effect is economically large at 8-16% of mean or standard deviation.

We next incorporate time periods outside of the recent interest rate hike and examine the full panel of firms from 2010Q1 to 2023Q4. We augment regression 5 by adding the interaction of the flow variables with changes in the federal funds rate:

$$Y_{j,t,t+4} = \beta_1 \Delta FFR_{t,t+1} \times LoanFlow_{j,t-8,t} + \beta_2 \Delta FFR_{t,t+1} \times BondFlow_{j,t-8,t} + \gamma Controls + FE + \epsilon_{j,t} \quad (6)$$

where $\Delta FFR_{t,t+1}$ denotes change in federal funds rates from quarter-end $t$ to quarter-end $t+1$, which is the first quarter during which capital expenditures is measured. In this specification, $\beta_1$ ($\beta_2$) captures how the impact of loan (bond) flows on subsequent investment varies with changes in interest rates. Using the full panel of data offers more statistical power and permits more granular controls. We include firm fixed effects to account for persistent differences in capital expenditures and rating letter-by-quarter fixed effects and Fama-French 12 industry-by-quarter fixed effects to flexibly control for time series variation in investment opportunities and access to capital. The regression also includes $LoanFlow_{j,t-8,t}$ and $BondFlow_{j,t-8,t}$ , so the interaction terms capture just changes in the relationship between capital flows and investment.

The results are reported in Panel A of Table 6, Column 2. Lagged loan and bonds flows have no significant impact on investment during periods when the federal funds rate is unchanged. However, when interest rates increase, investment is negatively related to lagged loan flow and positively related to lagged bond flow. If the federal funds rate increases by 1 percentage point, then a 1-percentage-point increase in loan (bond) flows is associated with lower (higher) capital expenditure equal to 0.66% (0.23%) of total assets during the rate hike. If the federal funds rate were to increase by 5 percentage points, the analogous estimated effect sizes are -3.3% and 1.2% of total assets, similar in magnitude to the estimates in Panel A.

## 4.1 Identifying the Causal Effect of Debt Structure on Monetary Policy Transmission

Our results above not only echo the existing evidence that debt structure matters for monetary policy transmission (Ippolito et al., 2018; Gürkaynak et al., 2022; Jungherr et al., 2022), they further suggest a strategy for causal identification. One limitation of the existing literature is the focus on raw observed debt structure, which is an endogenous object. According to the logic in Chen et al. (2021), firms may choose a higher floating-rate ratio in order to *offset* the interest rate sensitivity in other parts of their balance sheets – for example, their cash flows on the asset side may have become more sensitive to interest rates, or the credit supply by their non-fund investors have become less sensitive to interest rates. Indeed, Figure A3 shows evidence that floating-rate ratios are predictably higher (lower) for more (less) pro-cyclical industries such as durable goods (public utilities), whose revenues co-move more (less) with monetary policy rates. If firms choose the structure of their debt to *reduce* their overall interest rate exposure, OLS estimates using raw observed debt structure will be biased towards zero.

The endogeneity problem does not matter if we can thoroughly control for interest rate sensitivities on other parts of firms' balance sheets. For example, we can control for realized cash flows to address the fact that some firms' cash flows are more volatile and co-move more with interest rates (e.g. more pro-cyclical firms). However, some interest rate sensitivities can be hard to control for. For example, some firms are more reliant on funding from banks and CLOs that are more or less sensitive to interest rates than other debt investors, and their credit supply can be difficult to observe and could therefore remain as omitted variable bias.

We propose an identification strategy that uses fund flows as an instrument for debt structure changes. As previously discussed, fund flows create changes to relative borrowing cost of loans vs bonds, which lead firms to *deviate* from their natural debt structure (Table 4 shows strength of this "first stage"). Therefore, these flow-induced debt structure changes are solely driven by cost of capital concerns and plausibly orthogonal to other parts of firms' balance sheets. If capital flows have no impact on subsequent investment other than by changing a firm's exposure to interest rates, then fund flows provide a valid instrument. We use this strategy to identify the causal impact of debt structure on the sensitivity of investment to changes in interest rates.

We implement this strategy by running the following regression with change in floating-rate ratio as the main explanatory variable:

$$Y_{j,t,t+4} = \beta \Delta FFR_{t,t+1} \times \Delta FloatingRatio_{j,t-8,t} + \gamma Controls + FE + \epsilon_{j,t} \tag{7}$$

where $\Delta FloatingRatio_{j,t-8,t}$ denotes the change in firm $j$'s floating-rate ratio over the previous two years, from quarter-end $t-8$ to quarter-end $t$. Floating-rate ratio is defined as ratio of total debt that is floating-rate or maturing within one year. In the IV estimation of 7, we instrument for $\Delta FloatingRatio_{j,t-8,t}$ with loan flows and bond flows over the same period, $LoanFlow$ and $BondFlow$.

Column 1 of Panel B of Table 6 shows the ordinary least squares (OLS) estimates of 7, which imply that when the federal funds rate increases by 1 percentage point, a 1-percentage-point increase in the floating-rate ratio is associated with lower capital expenditure equal to 0.014% of total assets. The estimates are similar to the findings in Ippolito et al. (2018), Gürkaynak et al. (2022), and Jungherr et al. (2022). For example, Ippolito et al. (2018) shows that 1 p.p. increase in floating-rate ratio is associated with 4.34 basis point higher interest rate sensitivity of investment relative to property, plant and equipment (PPENT), which roughly translates to 0.015% of total assets for the average firm.

Column 2 of Panel B of Table 6 reports the two-stage least squares estimates. The first-stage Cragg-Donald F-statistic is 27.851, higher than the 5% critical value of 11.04 according to Stock and Yogo (2005).[4] The regression coefficient implies that when the federal funds rate increases by 1 percentage point, a 1-percentage-point increase in the floating-rate ratio is associated with lower capital expenditure equal to 0.179% of total assets. The IV estimate (-0.179) is considerably larger than the OLS estimate (-0.014). This is consistent with the interpretation that that raw observed floating-rate ratios are endogenous, and firms may choose a higher floating-rate ratio in order to *offset* the interest rate sensitivity in other

[4] We refer to Table 1 Column 5 of Stock and Yogo (2005), which shows the 5% critical value for two endogeneous regressors – change in floating-rate ratio and its interaction with change in FFR – and four instruments – loan flows, bond flows and their interactions with change in FFR.

parts of their balance sheets. If firms choose the structure of their debt to *reduce* their overall interest rate exposure, the OLS estimate will be biased towards zero. By using supply-side shocks coming from relative fixed income fund flows, we capture debt structure changes that are plausibly orthogonal to other parts of firm balance sheets and therefore constitute real *net* interest rate exposure.

The magnitude of the effects that we identify suggest that there are amplification besides changes in interest expenses themselves. The combination of 1 p.p. increase in federal funds rates and 1 p.p. increase in floating-rate ratio translates to 0.01 p.p. increase in interest expense ratio, or 0.05 p.p. over the typical loan life of 5 years, which is much smaller than the contraction in capital expenditure that we find. However, increases in interest expenses weaken the firm's balance sheet and increase its risk of default (Bernanke and Gertler, 1995). This raises the firm's cost of capital when issuing *new* debt, which raises the profitability threshold of investment opportunities in order to achieve positive NPV.

The remaining columns in Panel B of Table 6 provide further insights on the underlying mechanism. We ask the question: where does the reduction in capital expenditure come from? We use the IV version of 7 and replace capital expenditures with three other cash flow variables – interest expenses (XINT), net equity issuance (NEI), and net debt issuance (NDI) – that are measured over the same period and similarly scaled by total assets. Note that contemporaneous net income is already controlled for in the regression. Column 3 shows that firms with more floating-rate debt do not pay higher interest expenses. This is surprising since the interest expense on floating-rate debt increases mechanically when interest rates rise. This puzzle is solved by looking at Column 5, which shows that firms with more floating-rate debt raise significantly less debt on net. This is means that, while high-floating-ratio firms incur more interest expenses on *existing* debt, the lack of interest-sensitive debt allows low-floating-ratio firms to issue more *new* debt and maintain equivalent amount of *total* interest expenses in equilibrium. Column 4 shows little effect on net equity issuance. In summary, when interest rates rise, firms with more floating-rate debt raise less external financing, which translate to lower capital expenditures, consistent with financial accelerator mechanism (Bernanke and Gertler, 1995).

The evidence is also consistent with firms actively managing their interest expenses. When interest rates rise, firms with more floating-rate debt see a larger increase in interest expenses on *existing* debt, which discourages them from issuing new debt to avoid a further rise in their interest expenses. Greenwald (2019) shows that covenants in credit agreements that limit interest coverage are very common and argues that these covenants could be a reason why firms manage their interest expenses. In comparison, firms with more fixed-rate debt escape the impact of a rise in interest rate but issue more new debt (to invest in more capital) in equilibrium, which increases their interest expenses to about match that of firms with more floating-rate debt.

## 4.2 Evidence from Stock Returns around FOMC Announcements

In this subsection, we present additional evidence using stock returns on FOMC announcement days. This high-frequency event study helps mitigate endogeneity concerns that arise when examining quarterly changes in the federal funds rate. Quarterly changes in interest rates could reflect inflation or other macroeconomic news that could be the true driver of the firm investment behavior that we document. Although our analysis is about firm sensitivity to interest rate changes – whether or not they are fully predicted by other macroeconomic variables – examining pure interest rate shocks will help pinpoint the underlying mechanism. Following the large literature on monetary policy identification (e.g. Hanson and Stein, 2015), we examine two-day windows around FOMC announcements. During these narrow windows, there is unlikely any news other than changes in interest rates, so change in stock prices can be more confidently attributed solely to interest rate changes.

Our hypothesis is that, during the two-day windows around FOMC announcements, firms with higher floating-rate ratios due to prior fund flows have higher sensitivity of their stock returns to changes in interest rates. The assumption is that, stock investors are sophisticated and pay close attention to firms' floating-rate debt exposure, so when the Federal Reserve announces unexpected changes in interest rates, there will be immediate changes in stock prices to reflect the updated expectations of their future interest expenses and financing costs associated with floating-rate debt exposure. Specifically, in response to interest rate hikes (drops), firms with larger floating-rate ratios – which we can instrument with lagged fund flows – should experience lower (higher) stock returns.

We focus on the 111 pre-scheduled FOMC announcements from 2010 to 2023, the same window as our previous low-frequency analysis. We use the policy shocks developed by Nakamura and Steinsson (2018), extended to current day by Acosta et al. (2024). This measure is the first principal component of price changes, in a 30-minute window around the FOMC announcement, of five interest rate futures contracts with maturities of less than 1 year. To ease interpretation, we rescale these NS policy shocks so that 1 unit change in the NS policy shock corresponds to 1 p.p. change in the one-year Treasury rate over our sample period. Following Ippolito et al. (2018) and Gürkaynak et al. (2022), we use stock returns from the end of the day before the announcement to the end of the day after the announcement, which allows market participants sufficient time to process and trade based on the news. All firm variables, including the floating-rate ratio, are measured as of the quarter immediately prior to each announcement.

We run the following regression on the panel of U.S. speculative-grade firms (indexed by $j$) over the 111 FOMC announcements (indexed by $\tau$):

$$Return_{j,\tau} = \beta NS_{\tau} \times FloatingExposure_{j,\tau} + \gamma Controls + \epsilon_{j,\tau} \tag{8}$$

where $Return$ denotes the two-day return around each announcement, $NS$ denotes the policy shocks (scaled to be in the same unit as one-year Treasury rate in percentage point), and $FloatingExposure$ is one of the three measures of exposure to floating-rate debt: ex-ante loan flows and bond flows over the previous eight quarters, the floating-rate ratio, or change in floating-rate ratio over the previous eight quarters. Controls include log total assets, cash ratio, Tobin's Q, leverage, and profitability (see Appendix C for variable definitions). We include firm fixed effects and FOMC fixed effects.

Table 7 shows the results. Column 1 shows that, in response to 1 p.p. increase in the NS policy shock, there is on average 15.659 p.p. decline in stock returns for our sample of speculative-grade firms. This is larger than the stock sensitivity of investment-grade firms (9.842 p.p.), consistent with the fact that low-creditworthy firms tend to have much higher cash flow variation (Ozdagli, 2018).

The remaining columns add FOMC fixed effects to zoom in on variations in the cross section of firms. Column 2 shows that, in response to a 1 p.p. increase in the NS policy shock, firms with 1 p.p. higher loan flows (1 p.p. lower bond flows) during the previous quarters experience 1.051 p.p. (0.536 p.p.) more declines in stock returns. In other words, higher loan flows and lower bond flows amplify the stock return sensitivity to monetary policy. These effects are economically significant compared to the average monetary sensitivyt of -15.659 p.p.

Column 3 examines how the sensitivity varies with the observed floating-rate ratio, similar to Ippolito et al. (2018) and Gürkaynak et al. (2022). For our sample of speculative-grade firms from 2010 to 2023, firms with higher floating-rate ratios actually experience higher FOMC returns in response to interest rate hikes. Apart from the difference in sample period, the discrepancy with Ippolito et al. (2018) and Gürkaynak et al. (2022) is likely because we do not further segment firms based on textual descriptions of hedging operations. Column 4 shows that firms with recent increases in their floating-rate ratios experience lower FOMC returns during interest rate hikes. These results highlight the endogeneity of floating-rate ratios, i.e. firms can choose to have higher floating-rate ratios to *offset* the interest rate exposure arising from other parts of their balance sheets. Persistent level differences in floating-rate ratios are more likely to reflect endogenous choices, whereas recent changes in floating-rate ratios are relatively more likely to be deviations from endogenous choices, which indeed lead to more intuitive stock market responses.

To better address the endogeneity concerns and identify the causal effect of floating-rate debt on interest rate sensitivity, we instrument changees in floating-rate ratios with loan flows and bond flows over the previous eight quarters. The results are shown in Column 5. The Cragg-Donald F-statistic is 48.545, well above the 5% critical value of 11.04 according to Stock and Yogo (2005). The coefficient shows that, in response to +1 p.p. NS policy shock, firms with 1 p.p. higher floating-rate ratio experience 0.562 p.p. lower stock returns. Note that the magnitude is multiple times larger than the -0.032 p.p. from OLS regressions using raw observed changes in the floating-rate ratio. The results here, together with the quarterly real investment analyses in the previous section, highlight the potential endogeneity of floating-rate ratios, and suggest that, with proper instruments, the floating-rate channel of monetary policy transmission is much stronger than what prior studies suggest.

# 5 Conclusion

The structure of firm' *existing* debt has an important effect on their exposure to future shocks, such as changes in monetary policy rates. In this paper, we exploit the recent rise of fixed income funds that report detailed data and show that the supply of capital is an important determinant of firms' debt structure. Using fund flows to provide exogenous variation in debt structure, we revisit the floating-rate channel of monetary policy and estimate considerably larger sensitivities.

Our findings suggest that monetary policy makers would be well served to incorporate measures of floating-rate debt in corporate capital structure into their policy-making decisions. Moreover, our results indicate a new path dependency in monetary policy transmission. Existing research (Fang, 2023; Cetorelli et al., 2023) shows that monetary policy can influence the relative flows into loan and bond funds. Monetary tightening today can lead to higher loan flows relative to bond flows and therefore higher ratio of corporate debt that is floating-rate loans relative to fixed-rate bonds, which makes firms more sensitive to *future* changes in interest rates. This dynamic adds an additional level of foresight needed for optimal monetary policy.

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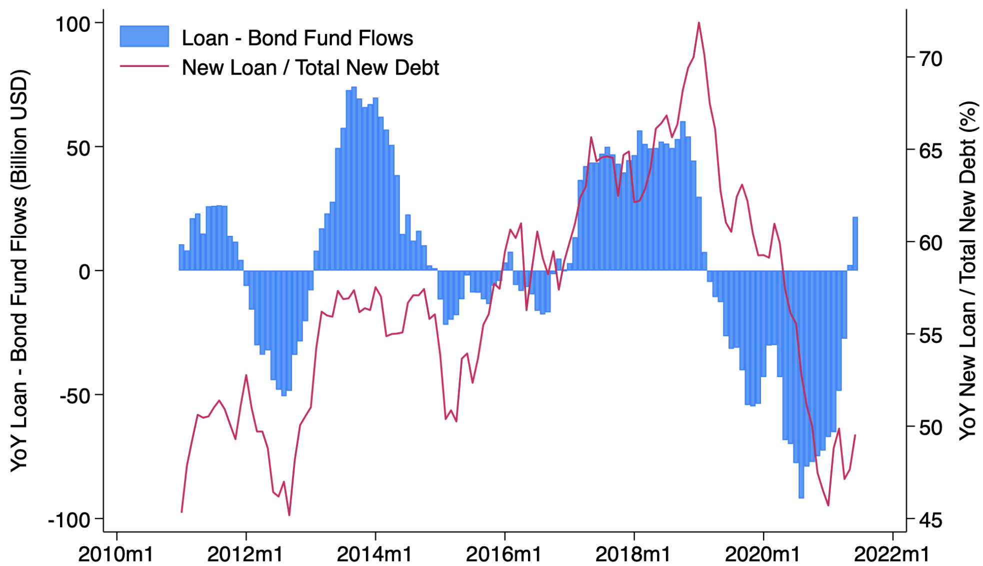
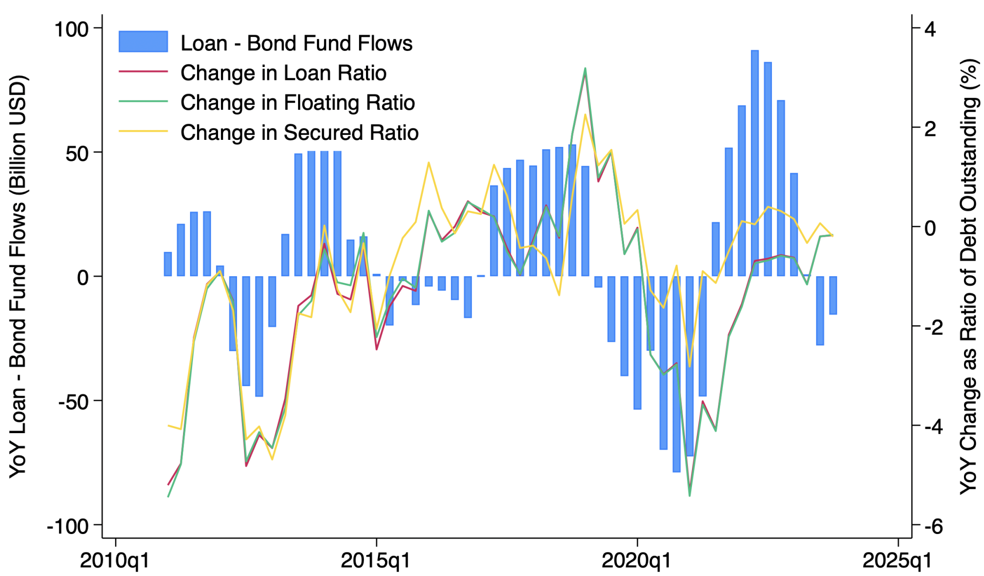
# Figures

Figure 1: **Corporate Debt Structure, Aggregate Time Series.** These figures show fixed income fund flows as a key determinant of the debt structure of U.S. speculative-grade non-financial firms in aggregate time series. The blue bars show year-over-year net flows to loan mutual funds relative to bond mutual funds. In Panel A, the line shows the ratio of new loans to total new debt issued, year over year. In Panel B, the lines show, respectively, year-over-year changes in the ratio of loans, the ratio of floating-rate debt, and the ratio of secured debt to total debt outstanding.

Panel A: New Debt Issuance




Panel B: Change in Debt Outstanding



# Tables

Table 1: **Summary Statistics.** This table shows summary statistics of the main variables in our analysis. $LoanFlow/Debt$ ($BondFlow/Debt$) are weighted sum of year-over-year net flows to a firm's existing loan fund investors (bond fund investors), according to Equation 3. $NewLoan/NewDebt$ is ratio of new loans to total new debt issuances, year over year. $LoanDebt/TotalDebt$, $FloatingDebt/TotalDebt$, and $SecuredDebt/TotalDebt$ are amount of debt that is loan, floating-rate or maturing within one year, and secured relative to total debt outstanding. Definitions of the remaining control variables are given in Appendix C. The sample includes 1,117 non-financial speculative-grade firms from 2010Q1 to 2023Q4.

| | N | Mean | SD | P25 | P50 | P75 |
|---|---|---|---|---|---|---|
| Loan Flow / Debt (%) | 39368 | 0.01 | 1.05 | -0.01 | 0.00 | 0.00 |
| Bond Flow / Debt (%) | 39368 | -0.12 | 1.33 | -0.57 | 0.00 | 0.11 |
| New Loan / New Debt (%) | 16971 | 48.77 | 46.18 | 0.00 | 47.41 | 100.00 |
| Loan Debt / Total Debt (%) | 39368 | 63.15 | 36.14 | 31.65 | 68.63 | 100.00 |
| Change | 36944 | -1.36 | 17.26 | -2.01 | 0.00 | 1.30 |
| Floating Debt / Total Debt (%) | 39368 | 63.56 | 35.89 | 32.59 | 69.22 | 100.00 |
| Change | 36944 | -1.39 | 17.27 | -2.04 | 0.00 | 1.23 |
| Secured Debt / Total Debt (%) | 39368 | 69.01 | 34.42 | 42.55 | 80.35 | 100.00 |
| Change | 36944 | -0.92 | 15.99 | -1.06 | 0.00 | 0.89 |
| Capital Expenditure / TA (%) | 37138 | 9.78 | 13.66 | 2.22 | 5.01 | 10.91 |
| Interest Expense / TA (%) | 37138 | 3.03 | 2.05 | 1.65 | 2.53 | 3.87 |
| Net Debt Issuance / TA (%) | 37138 | 2.94 | 12.22 | -2.43 | 0.00 | 4.55 |
| Net Equity Issuance / TA (%) | 37138 | -1.06 | 5.72 | -2.51 | -0.26 | 0.00 |
| Log Total Assets | 39368 | 7.99 | 1.15 | 7.18 | 7.91 | 8.76 |
| Cash / TA (%) | 39368 | 45.89 | 22.85 | 30.32 | 42.98 | 57.90 |
| Debt / TA (%) | 39368 | 9.20 | 9.29 | 2.45 | 6.22 | 12.79 |
| Net Income / TA (%) | 35082 | 0.33 | 10.91 | -2.03 | 1.97 | 5.25 |

Table 2: **Determinants of Aggregate Corporate Debt Structure.** This table shows determinants of corporate debt structure in aggregate time series, based on Regression 1. All variables are scaled to have unit standard deviation so that their economic magnitudes are directly comparable.

| Dependent Variable | New Loan / Total New Debt (%) | | Change in Loan Debt / Total Debt (%) | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Lagged Loan – Bond Fund Flow | 3.992*** | 3.552*** | 1.021*** | 1.098** |
| | (3.871) | (6.592) | (3.952) | (3.307) |
| ΔTreasury Debt Maturity | -2.552* | -3.611*** | -0.532* | -0.307 |
| | (-2.596) | (-6.934) | (-2.179) | (-0.931) |
| ΔFFR | | 4.046*** | | -0.260 |
| | | (5.074) | | (-0.789) |
| Δ10Y Treasury Yield | | -0.981 | | -0.008 |
| | | (-1.634) | | (-0.028) |
| ΔBAA – AAA Spread | | -1.487* | | 0.429 |
| | | (-2.290) | | (1.078) |
| GDP Growth | | -2.797*** | | -0.548 |
| | | (-3.807) | | (-1.659) |
| CPI Inflation | | 2.210*** | | -0.095 |
| | | (3.763) | | (-0.255) |
| Standard Errors | Newey-West (1994) | | | |
| Observations | 41 | 41 | 51 | 51 |
| R2 | 0.448 | 0.772 | 0.349 | 0.416 |

Table 3: **Fixed Income Fund Investment Stickiness.** These tables show that, in response to fund flows, the investments of bond funds (loan funds) are predictably tilted towards bonds (loans) issued by portfolio firms (i.e. firms that they already hold in their portfolios), according to Regression 2. t-statistics are reported in parentheses. *, **, and *** denote p-values less than 0.10, 0.05, and 0.01, respectively.

Panel A: Bond Funds

| Dependent Variable | Net Purchase (% of Total Corporate Debt Holding) | | | |
|---|---|---|---|---|
| | All Bonds | Portfolio Bonds | All Loans | Portfolio Loans |
| | (1) | (2) | (3) | (4) |
| Fund Inflow (%) | 0.92*** | 0.69*** | 0.08*** | 0.02*** |
| | (21.83) | (10.95) | (4.23) | (2.95) |
| Fund Outflow (%) | 0.96*** | 0.74*** | 0.04*** | 0.02* |
| | (7.14) | (6.01) | (3.60) | (1.92) |
| Fund FE | Y | Y | Y | Y |
| Firm FE x Quarter FE | Y | Y | Y | Y |
| Standard Errors | Clustered by fund and by quarter | | | |
| Observations | 10258 | 11304 | 10258 | 11304 |
| R2 | 0.77 | 0.76 | 0.18 | 0.56 |

Panel B: Loan Funds

| Dependent Variable | Net Purchase (% of Total Corporate Debt Holding) | | | |
|---|---|---|---|---|
| | All Bonds | Portfolio Bonds | All Loans | Portfolio Loans |
| | (1) | (2) | (3) | (4) |
| Fund Inflow (%) | 0.11*** | 0.05* | 0.84*** | 0.57*** |
| | (3.82) | (1.99) | (25.94) | (12.63) |
| Fund Outflow (%) | 0.11** | 0.09 | 0.79*** | 0.55*** |
| | (2.62) | (1.50) | (6.96) | (8.43) |
| Fund FE | Y | Y | Y | Y |
| Firm FE x Quarter FE | Y | Y | Y | Y |
| Standard Errors | Clustered by fund and by quarter | | | |
| Observations | 2340 | 2623 | 2340 | 2623 |
| R2 | 0.22 | 0.24 | 0.90 | 0.68 |

Table 4: **Firm-Specific Capital Flows and Debt Structure Changes.** These tables examine how our measures of firm-specific loan flows and bond flows in Equation 3 affect debt structure in the cross section of firms. Panel A focuses on new loan issuance relative to total new debt issued, year over year, where observations without new debt issuance are dropped. Panel B examines changes in loans, floating-rate debt and secured debt relative to total debt outstanding. t-statistics are reported in parentheses. *, **, and *** denote p-values less than 0.10, 0.05, and 0.01, respectively.

Panel A: New Debt Issuance

| Dependent Variable | New Loan / Total New Debt (%) | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Loan Flow (%) | 1.469*** | 1.632*** | 1.937*** | 1.427*** | 1.718*** |
| | (4.026) | (3.965) | (4.261) | (3.402) | (3.640) |
| Bond Flow (%) | -2.800*** | -2.183*** | -2.057*** | -2.278*** | -2.198*** |
| | (-6.964) | (-5.636) | (-4.757) | (-5.933) | (-5.130) |
| Controls | Log Total Assets, Cash Ratio, Tobin's Q, Leverage, Profitability | | | | |
| Firm FE | Y | Y | Y | Y | Y |
| Quarter FE | | Y | | | |
| Quarter FE x Rating FE | | | Y | | Y |
| Quarter FE x Industry FE | | | | Y | Y |
| Standard Errors | Clustered by Firm and by Quarter | | | | |
| Observations | 16388 | 16388 | 14021 | 16387 | 14020 |
| R2 | 0.569 | 0.580 | 0.589 | 0.598 | 0.608 |

Panel B: Change in Debt Outstanding

| Dependent Variable | ΔLoan Ratio | ΔFloating Ratio | ΔSecured Ratio |
|---|---|---|---|
| | (1) | (2) | (4) |
| Loan Flow (%) | 0.688*** | 0.685*** | 0.440*** |
| | (4.005) | (3.962) | (3.058) |
| Bond Flow (%) | -1.088*** | -1.052*** | -0.912*** |
| | (-4.429) | (-4.319) | (-4.767) |
| Controls | Log Total Assets, Cash Ratio, Tobin's Q, Leverage, Profitability | | |
| Firm FE | Y | Y | Y |
| Quarter FE x Rating FE | Y | Y | Y |
| Quarter FE x Industry FE | Y | Y | Y |
| Standard Errors | Clustered by Firm and by Quarter | | |
| Observations | 31019 | 31019 | 31019 |
| R2 | 0.133 | 0.133 | 0.132 |

Table 5: **Firm-Specific Capital Flows and Issuance Costs.** The table examines how our measures of firm-specific loan flows and bond flows in Equation 3 affect cost of issuing new loans (Column 1) and new bonds (Columne 2). t-statistics are reported in parentheses. *, **, and *** denote p-values less than 0.10, 0.05, and 0.01, respectively.

| Dependent Variable | Loan Offering Spread (%) | Bond Offering Spread (%) |
|---|---|---|
| | (1) | (2) |
| Loan Flow (%) | -0.054** | 0.005 |
| | (-2.146) | (0.101) |
| Bond Flow (%) | -0.009 | -0.130* |
| | (-0.431) | (-1.897) |
| Controls | Log Total Assets, Cash Ratio, Leverage, Tobin's Q, Profitability, Credit Rating, Years to Maturity, Log Issuance Amount | |
| Firm FE | Y | Y |
| Quarter FE x Rating FE | Y | Y |
| Standard Errors | Clustered by Quarter FE x Rating FE | |
| Observations | 5853 | 2763 |
| R2 | 0.675 | 0.551 |

Table 6: **Flow-Induced Debt Structure Changes and Firm Investment Sensitivity to Interest Rate.** These tables examine the cross-sectional relationship between flow-induced debt structure changes and firm investment sensitivity to changes in federal funds rates, according to Regressions 5, 6 and 7. t-statistics are reported in parentheses. *, **, and *** denote p-values less than 0.10, 0.05, and 0.01, respectively.

Panel A: Recent Rate Hike

| Dependent Variable (% of Total Assets) | 2022-2023 CAPX | YoY CAPX (t to t+4) |
|---|---|---|
| Sample | Year-End 2021 | 2010Q1-2023Q4 |
| | (1) | (2) |
| Lagged Loan Flow (%, t-8 to t) | -2.195* | -0.053 |
| | (-1.782) | (-0.694) |
| × Change in Federal Funds Rate (%, t to t+1) | | -0.663*** |
| | | (-3.183) |
| Lagged Bond Flow (%, t-8 to t) | 1.339*** | 0.017 |
| | (2.921) | (0.255) |
| × Change in Federal Funds Rate (%, t to t+1) | | 0.226** |
| | | (2.062) |
| Controls | Log Total Assets, Cash Ratio, Tobin's Q, Leverage, Profitability | |
| Firm FE | | Y |
| Rating FE × Quarter FE | Y | Y |
| Industry FE × Quarter FE | Y | Y |
| Standard Errors | Clustered by Firm and by Quarter | |
| Observations | 499 | 24699 |
| R2 | 0.223 | 0.484 |

Panel B: 2010Q1-2023Q4

| Dependent Variable (% of Total Assets) | CAPX | CAPX | XINT | NEI | NDI |
|---|---|---|---|---|---|
| | OLS | 2SLS | 2SLS | 2SLS | 2SLS |
| | (1) | (2) | (3) | (4) | (5) |
| Lagged Change in Floating Ratio (%, t-8 to t) | -0.006 | 0.002 | -0.001 | -0.004 | 0.168 |
| | (-1.149) | (0.036) | (-0.111) | (-0.115) | (1.581) |
| × Change in Federal Funds Rate (%, t to t+1) | -0.014* | -0.179** | 0.002 | 0.001 | -0.199* |
| | (-1.868) | (-2.487) | (0.322) | (0.065) | (-1.649) |
| Controls | Log Total Assets, Cash Ratio, Tobin's Q, Leverage, Profitability | | | | |
| Firm FE | Y | Y | Y | Y | Y |
| Rating FE × Quarter FE | Y | Y | Y | Y | Y |
| Industry FE × Quarter FE | Y | Y | Y | Y | Y |
| Standard Errors | Clustered by Firm and by Quarter | | | | |
| Observations | 24699 | 28136 | 28136 | 28136 | 28136 |
| R2 | 0.484 | 0.484 | 0.852 | 0.510 | 0.338 |
| Cragg-Donald F-statistic | | 27.851 | 27.851 | 27.851 | 27.851 |

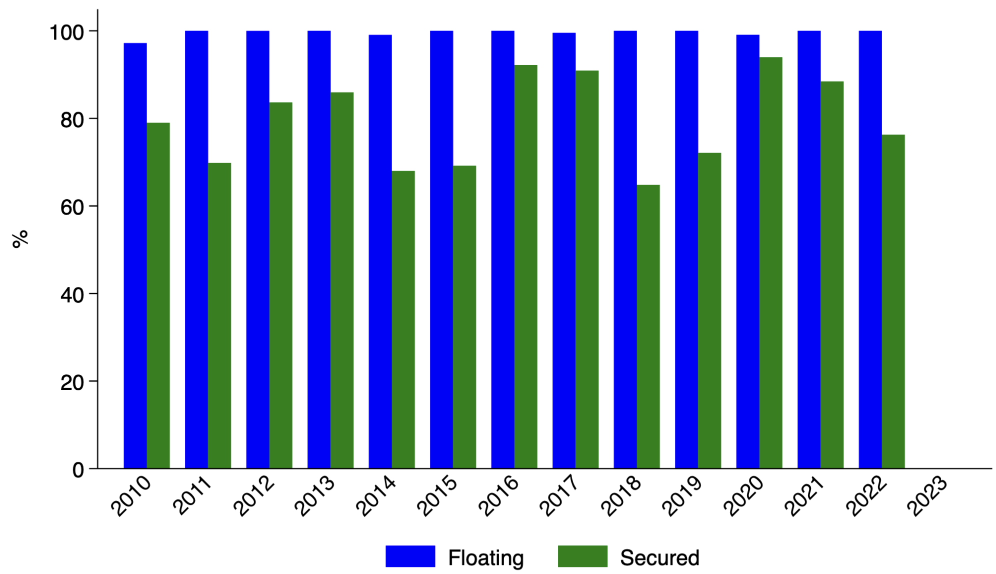
Table 7: **Flow-Induced Debt Structure Changes and FOMC Announcement Returns.** The table examines the cross-sectional relationship between flow-induced debt structure changes and stock return sensitivity to interest rate shocks during two-day windows around FOMC announcements, according to regression (8). t-statistics are reported in parentheses. *, **, and *** denote p-values less than 0.10, 0.05, and 0.01, respectively.

| Dependent Variable | FOMC Announcement Return (%) | | | | |
|---|---|---|---|---|---|
| | OLS | OLS | OLS | OLS | 2SLS |
| | (1) | (2) | (3) | (4) | (5) |
| NS Policy Shock | -15.659* | | | | |
| | (-1.952) | | | | |
| Lagged Loan Flow (%) | | 0.008 | | | |
| | | (0.486) | | | |
| × NS Policy Shock | | -1.051 | | | |
| | | (-1.524) | | | |
| Lagged Bond Flow (%) | | 0.007 | | | |
| | | (0.843) | | | |
| × NS Policy Shock | | 0.536** | | | |
| | | (2.458) | | | |
| Floating Ratio (%) | | | 0.000 | | |
| | | | (0.366) | | |
| × NS Policy Shock | | | 0.030* | | |
| | | | (1.716) | | |
| Change in Floating Ratio (%) | | | | 0.000 | -0.007 |
| | | | | (0.479) | (-0.534) |
| × NS Policy Shock | | | | -0.032** | -0.562** |
| | | | | (-2.010) | (-2.429) |
| Controls | Log Total Assets, Cash Ratio, Tobin's Q, Leverage, Profitability | | | | |
| Firm FE | Y | Y | Y | Y | Y |
| FOMC FE | | Y | Y | Y | Y |
| Standard Errors | Clustered by Firm and by FOMC | | | | |
| Observations | 61370 | 53029 | 61370 | 53029 | 53029 |
| R2 | 0.042 | 0.469 | 0.489 | 0.468 | 0.469 |
| Cragg-Donald F-statistic | | | | | 48.510 |

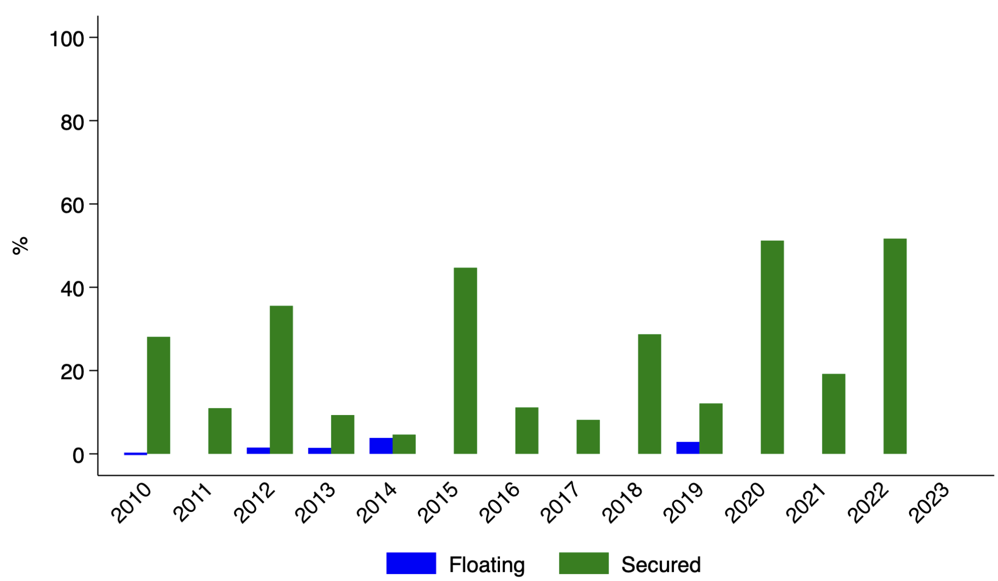
# Appendix A Additional Figures

Figure A1: **Aggregate Firm Statistics.** The graphs plot aggregate statistics for publicly-traded U.S. non-financial firms.

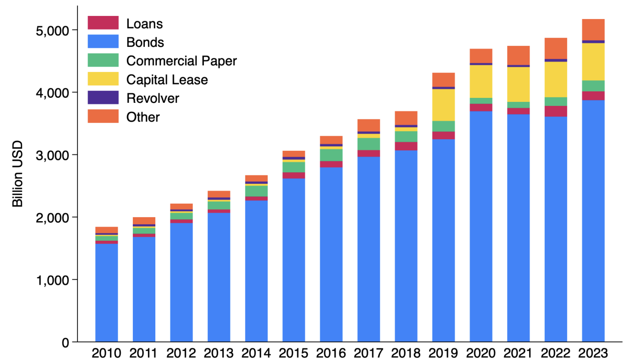
Characteristics of Speculative-Grade Loan Issuances



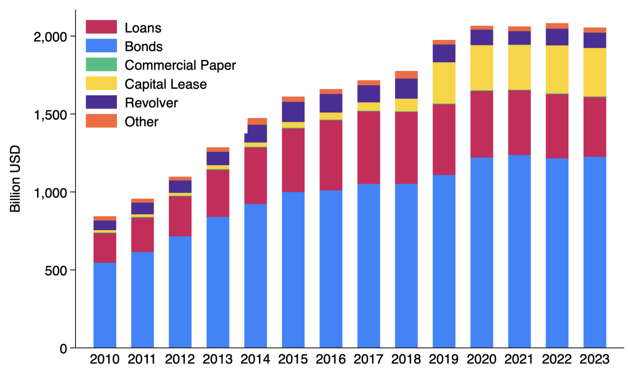

Characteristics of Speculative-Grade Bond Issuances



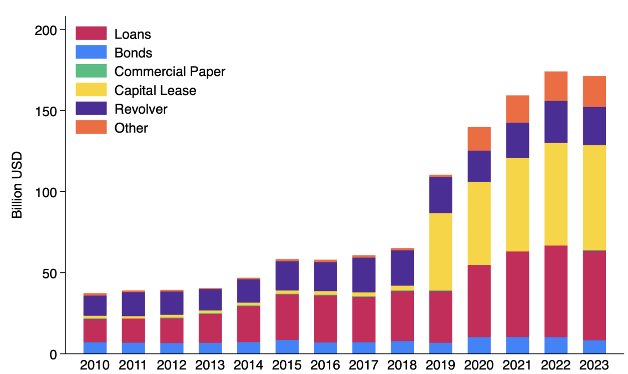
Investment-Grade Firms, Debt Composition



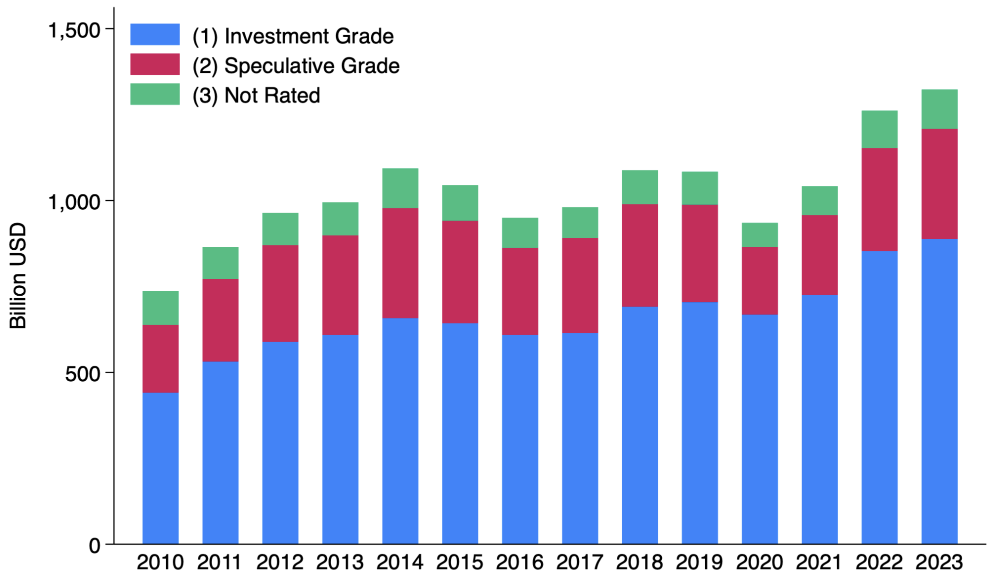

Speculative-Grade Firms, Debt Composition



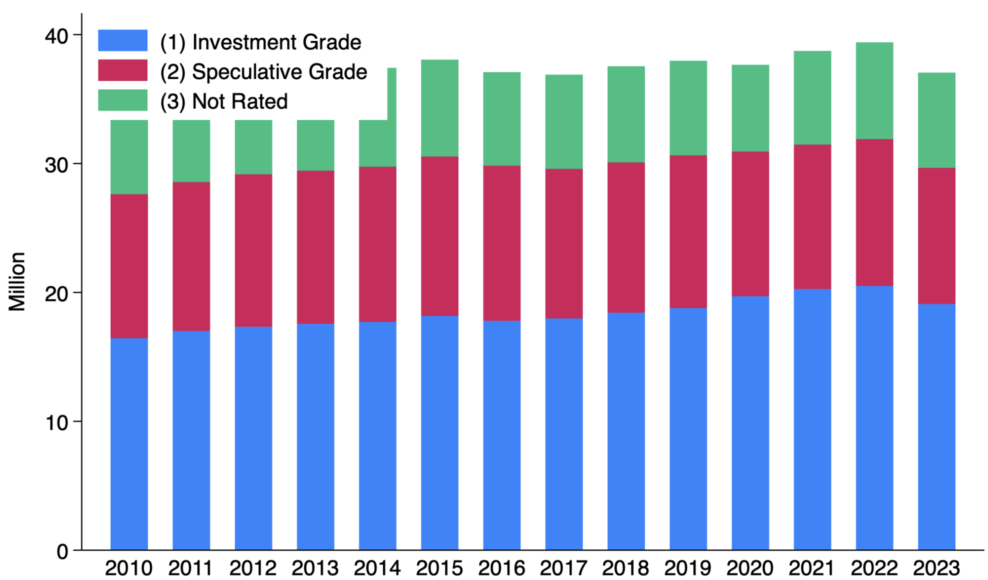

Non-Rated Firms, Debt Composition



Aggregate Capital Expenditure




Aggregate Employment



Speculative-Grade Bonds, Investor Composition

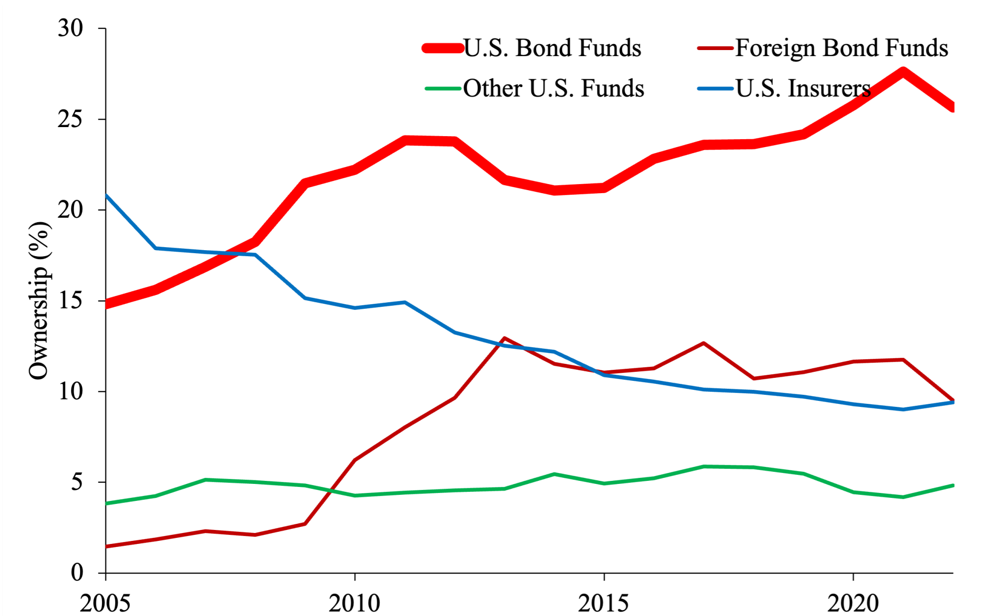
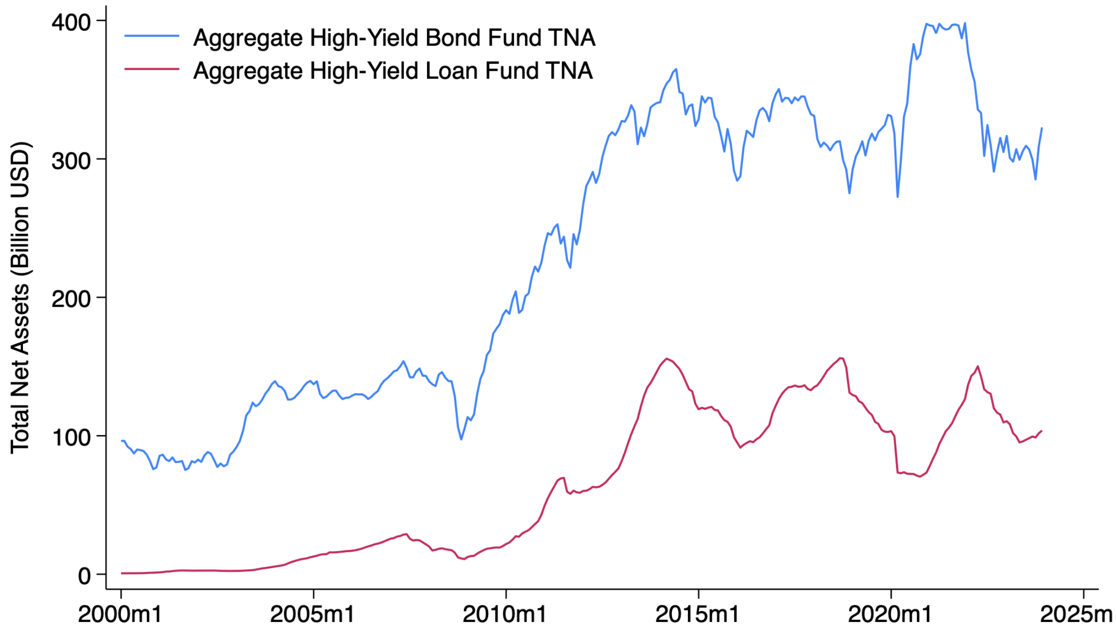


Figure A2: **Aggregate Bond Funds and Loan Funds.**

Aggregate Fund Size




Aggregate Fund Flows

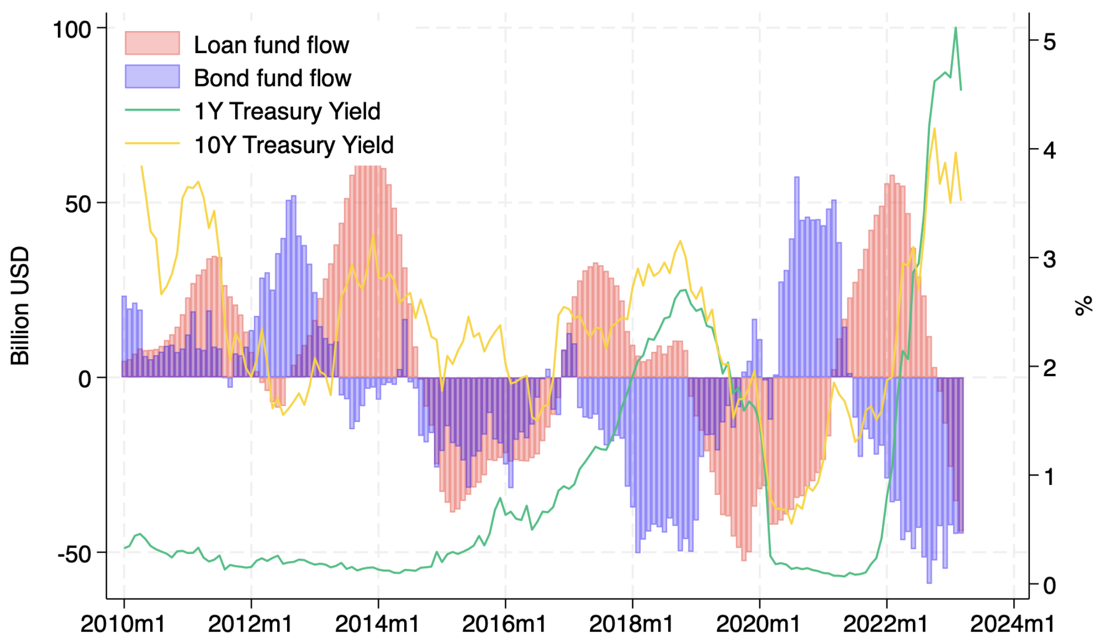
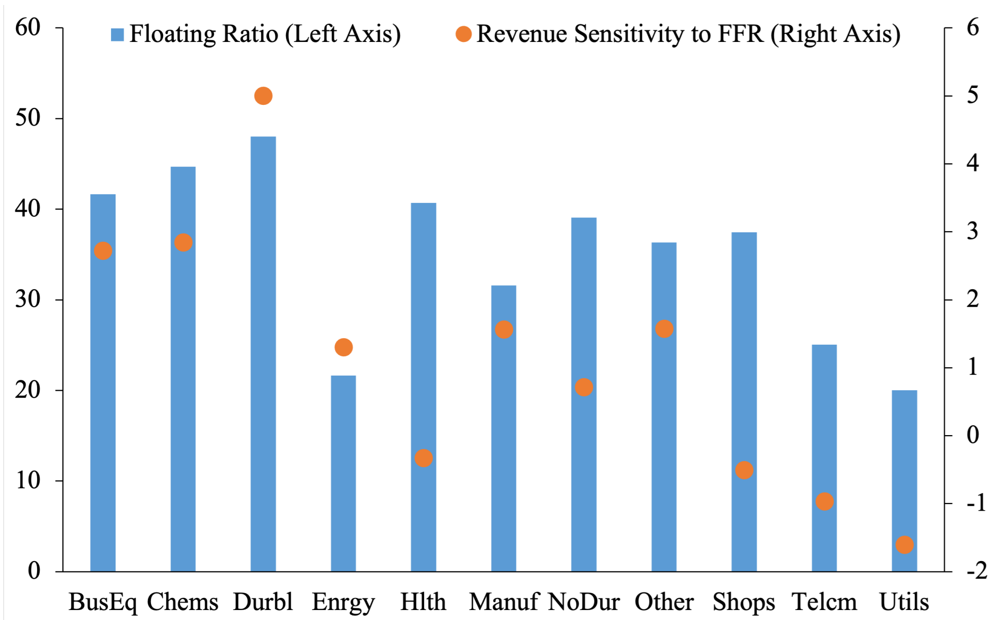


Figure A3: **The Endogeneity of Floating-Rate Ratio.** This figure illustrates the endogeneity of floating-rate ratio with respect to asset cash flow. It shows, for each of the Fama-French 12 industries, the weighted average floating-debt ratio (blue bars) and the weighted average revenue sensitivity to federal funds rate (orange dots).



# Appendix B Additional Tables

Table A1: **Firm-Specific Capital Flows and Debt Structure Changes, Robustness.**

| Dependent Variable | Change in Loan Debt / Total Debt (%) | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Loan Flow (%) | 0.254* | 0.838*** | 0.852*** | 0.812*** | 0.840*** |
| | (1.825) | (4.979) | (4.914) | (4.681) | (4.465) |
| Bond Flow (%) | -1.020*** | -0.686*** | -0.875*** | -0.687*** | -0.876*** |
| | (-5.333) | (-3.012) | (-4.322) | (-2.867) | (-4.096) |
| Log Total Assets | -0.094 | -1.085** | -3.315*** | -1.056** | -3.429*** |
| | (-0.207) | (-2.283) | (-5.278) | (-2.107) | (-5.329) |
| Cash / TA (%) | 0.131*** | 0.147*** | 0.151*** | 0.150*** | 0.155*** |
| | (4.172) | (4.903) | (4.450) | (4.904) | (4.537) |
| Debt / TA (%) | -0.006 | -0.027 | -0.106*** | -0.025 | -0.099*** |
| | (-0.338) | (-1.564) | (-5.643) | (-1.419) | (-5.111) |
| Net Income / TA (%) | -0.092*** | -0.109*** | -0.078*** | -0.096*** | -0.071*** |
| | (-3.133) | (-3.973) | (-3.131) | (-3.630) | (-2.843) |
| Firm FE | Y | Y | Y | Y | Y |
| Quarter FE | | Y | | | |
| Quarter FE x Rating FE | | | Y | | Y |
| Quarter FE x Industry FE | | | | Y | Y |
| Standard Errors | Clustered by Firm and by Quarter | | | | |
| Observations | 32736 | 32736 | 28070 | 32734 | 28069 |
| R2 | 0.089 | 0.103 | 0.131 | 0.116 | 0.147 |

# Appendix C Additional Details on Data and Variables

Firm-level variables are defined as:

- Log total assets: the logarithm of total assets ($AT$)
- Total debt: debt in current liabilities ($DLC$) and long-term debt ($DLTT$)
- Cash ratio: cash holdings ($CHE$) divided by total assets ($AT$)
- Tobin's Q: total debt ($DLC + DLTT$) plus market value of equity ($PRCC \times CSHO$) minus current assets ($ACT$) divided by plant, property and equipment ($PPEGT$), following Erickson and Whited (2012)
- Leverage: total debt divided by total assets
- Profitability: net income ($NI$) divided by total assets ($AT$)
- Net debt issuance: long-term debt issuance ($DLTIC$) minus long-term debt reduction ($DLTC$)
- Net equity issuance: sale of common and preferred stock ($SSTK$) minus repurchase of common and preferred stock ($PRSTKC$) and dividends ($DV$)
- Real investment: capital expenditure ($CAPX$)