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

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Abstract

We use mutual fund flows as instruments to re-evaluate the impact of corporate debt structure on the transmission of monetary policy. Larger flows to loan funds relative to bond funds lead firms to opportunistically issue more floating-rate loans relative to fixed-rate bonds, and we show that fund flows better predict corporate debt structure than previously identified determinants. We construct firm-specific flows based on sticky fund-firm relationships and use them as instruments to better identify how debt structure impacts the sensitivity of corporate investment to monetary policy. Accounting for the endogenous choice of debt structure is important; we estimate a sensitivity that is an order of magnitude larger than previous estimates. According to our estimate, aggregate capital expenditures would have been nearly $1 trillion higher during the recent tightening cycle if all floating-rate corporate debt had been replaced with fixed-rate debt.

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

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1 Introduction

Interest rate volatility has increased notably since the onset of the COVID pandemic in 2020. After falling sharply during the COVID-related recession, the federal funds rate increased by more than 5 percentage points in a span of less than 18 months as the Federal Reserve tightened monetary policy to fight inflation. With notable changes in policies under the Trump administration, there is considerable uncertainty about where monetary policy will ultimately settle. At year-end 2024, Merrill Lynch's index of options-implied interest rate volatility stood at a level nearly twice its pre-COVID level.[1]

How do changes in interest rates affect firms? The structure of a firm's debt, particularly the share of debt that is floating rate, should be an important determinant. During the recent monetary tightening cycle, for example, a firm fully funded with floating-rate debt would have seen its interest expense rise substantially more than a firm fully funded with long-term fixed-rate debt. In this paper, we establish that relative flows to fixed income mutual funds are a key determinant of firms' choice between fixed- and floating-rate debt and use this fact to causally identify the effect of corporate debt structure on the transmission of monetary policy.

We focus on U.S. publicly-traded speculative-grade firms, which actively borrow using both floating-rate loans and fixed-rate bonds. This funding variability lets us separate the effect of debt structure (floating rate vs. fixed rate) from the effect of capital structure (equity vs. debt) by zooming in on firms with similar leverage but different amounts of floating-rate debt. Our analysis exploits the rise of fixed income mutual funds and ETFs, which have become particularly important corporate lenders since the 2008 financial crisis. These funds report security-level holdings and monthly investor flows, which enable us to construct *firm-specific* credit supply shocks. Using these credit supply shocks as instruments, we identify

[1] According to Yahoo finance, the MOVE index was 58 at the end of 2019 and nearly 100 at the end of 2024.

the causal effect of debt structure on monetary policy transmission to firm investment and stock returns.

We start by showing a very strong time series correlation between the aggregate flows into loans funds, relative to bond funds, and the aggregate issuance of loans as opposed to bonds. During periods when loan funds experience relatively high inflows, 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, interest rates, 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. Since loans nearly always pay a floating-rate and bonds nearly always pay a fixed-rate, relative fund flows can impact the subsequent debt structures of firms and their exposure to changes in interest rates.

We then construct *firm-specific* measures 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 to 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 based on the aggregate flows to each fund and each fund's preexisting investment in the firm. Intuitively, the measure captures the amount of buying or selling from each firm's existing debt holders if 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 and robust to including a host of control variables. In our strictest specification, we include rating-time and industry-time fixed effects, which effectively narrows the 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 these flow-induced debt structure changes reflect 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 newly issued loans (bonds). The fact that borrowing costs and 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.

Although catering to variation in supply can reduce the cost of credit, flow-induced debt structure changes also create exposure to future interest rate changes, which firms do not fully eliminate. Our estimates show that, compared with an average firm, a firm with 1 p.p. higher loan flows (bond flows) 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 their interest rate exposure with derivatives due to counterparty risks (Cenedese et al., 2020).

We use our firm-specific fund flow measure to re-examine how debt structure affects firms' sensitivity to monetary policy. Prior literature examining this question has used raw observed debt structures (Ippolito et al., 2018; Gürkaynak et al., 2022; Jungherr et al., 2022), which are likely endogenously chosen by firms to *offset* exposure to interest rates arising from other parts of firms' operations. For example, we show that firms' use of floating-rate debt is correlated with the sensitivity their assets to changes in interest rates. In contrast, our flow-induced debt structure changes are likely orthogonal to these other considerations, which allow us to provide a causal identification of the floating-rate channel of monetary policy. Indeed, our results using fund flows as an instrument suggest that the effect of floating-rate debt ratio on firms' investment sensitivity to interest rates 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 the sensitivity of investment to interest rates. We find that most of the change in investment reflects new debt issuance, with firms having more floating-rate debt issuing less new debt in response to a rise in interest rates. This finding is consistent with models of the financial accelerator, where increases in interest expenses on *existing* floating-rate debt weaken firms' balance sheets and amplify the frictions associated with *new* debt issuance (Bernanke and Gertler, 1995). The results are also consistent with firms actively managing their interest coverage ratios, where increases in interest expense on existing debt mechanically crowd 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' valuations. 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 firms' debt, identified with the proper instrument, can have a large effect on firms' response to monetary policy.

Lastly, we use our results to quantify the *aggregate* impact of the floating-rate channel during the recent interest rate hike. The largest publicly traded firms use almost exclusively fixed-rate debt, but smaller public firms and private firms rely quite heavily on floating-rate loans. We apply our IV estimate to calculate the counterfactual capital expenditures for each public firm and all private firms, under the scenario that all of their debt been fixed-rate before the rate hike. Based on our estimated sensitivity, aggregate capital expenditure would have been $0.96 trillion larger during the rate hike period from 2021 to 2023, which is an increase of 17% relative to the actual amount. The effect of debt structure would be an order of magnitude smaller if we instead use the OLS estimate of the sensitivity.

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. In comparison to the large literature on the choice of debt versus equity, there is still limited understanding of the choice between floating-rate versus fixed-rate debt, an important aspect of firms' capital structure. There is a large literature on corporate debt maturity that focuses on rollover risk, 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). In comparison, we establish relative flows to fixed income mutual funds as a leading determinant of corporate debt structure in the post-GFC era. 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* measures of credit supply that allow us to filter out confounding time series effects. Our estimates using the cross-section of firms confirm that firms respond to the relative supply of bonds and loans.

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, whereas loans tend to be floating-rate (Nini and Smith, 2024). Panel E of Figure A1, using data from Dealscan and Mergent FISD, shows that nearly all speculative-grade loans are floating-rate and almost zero speculative-grade corporate bonds are floating-rate. There are many institutional reasons for the systematic differences between bonds and loans. For example, banks traditionally have been the largest investors in loans, and they prefer floating-rate debt to match with the floating-rate interests paid on deposits (Supera, 2021). Similarly, insurance companies have traditionally been a dominant investors in corporate bonds, and they prefer long-term fixed-rate debt that matches the long duration of their liabilities arising from long-term life insurance policies and annuities.

We focus on publicly-traded U.S. firms with a speculative-grade credit rating because these firms borrow using both floating-rate loans and fixed-rate bonds. Having a credit rating and registering with the SEC ensures that these firms can easily access the bond market. Yet unlike investment-grade firms, loans are still an important source of capital since the majority of bond investors, such as insurance companies, face mandates or regulations against non-investment-grade holdings. The bottom panels in Figure A1 compare speculative-grade firms with investment-grade firms and unrated firms. The figure shows that speculative-grade firms, on average, use both bonds and loans, with the ratio hovering around 3:1 in aggregate. In contrast, investment-grade firms use very few loans, and unrated firms use very very few bonds.

Although only a subset of publicly-traded firms, speculative-grade firms are economically important. Figure A1 shows that they account for about $300 billion of annual capital expenditures and 10 million of employment, each more than one-third of the total for public firms. More importantly, these firms serve as a unique laboratory to study the effect of debt structure, and our evidence likely applies broadly to all firms. For firms that issue only bonds or loans, debt structure is perfectly correlated with leverage, which makes it difficult to separately identify the impact of debt structure. For example, two unrated firms that have different amounts of floating-rate debt likely have different amounts of leverage, so differences in their sensitivity to interest rate changes could be due to difference in leverage, as shown in (Ottonello and Winberry, 2020), rather than difference in debt structure. In contrast, for speculative-grade firms, there is large variability in the use of fixed-rate bonds versus floating-rate loans that 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 in corporate debt. Figure A2 shows tremendous growth in fixed income mutual 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 the fund "invests primarily in non-investment grade bonds with maturities of 10 years or less." Similarly, the prospectus of Invesco Senior Floating Rate Fund states "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 a bond fund if the median value of its bond fraction, across all periods, is above 75%. We define loan funds similarly. 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 US 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 U.S. funds with missing holdings in CRSP, we manually download their holdings from Morningstar Direct.

To calculate a measure of firm-specific credit supply, we map the individual holdings of bonds and loans to the underlying issuers. 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 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, leaving us with a total of 1,173 firms. Summary statistics for their characteristics are given in Table 1.

Data on firms' debt structures come primarily from Capital IQ, which is based on information reported in 10K, 10Q, and other SEC filings. We supplement this data with bond-level data from FISD and Refinitiv, which provides more detail than Capital IQ on the characteristics of outstanding bonds. 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, since the debt 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 examining the aggregate time series in Figure 1. The blue bars show the monthly time series of annual net flows to loan funds less net flows to bond funds.[3] In Panel A, the red line plots the fraction of newly issued debt that is loans over the same period. There is a strong positive correlation (0.62) between relative loan versus bond flows and the aggregate issuance of loans relative to bonds. When there are more inflows (outflows) to loan funds or more outflows (inflows) to bond funds, firms are more likely to issue a loans than a bond.

In Panel B, which shows quarterly rather than monthly frequency, we plot the year-over-year changes in the fraction of outstanding debt that is loan (red), floating rate (green), or about to be repriced (yellow).[4] These level changes follow similar trajectories as new issuances and are also strongly positively correlated with relative loan versus bond fund flows, albeit with a lag. Relative to new issuance in Panel A, changes in levels also capture the impact of debt

[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 loan fund flows and bond fund flows are comparable in magnitude and both are important in driving the dynamics of their difference.

[4]Repricing debt is defined as debt that is floating rate or maturing and therefore about to be repriced within a year.

retirement. 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. Differences between the three series are small and mainly come from floating-rate credit lines and fixed-rate bonds that are maturing within a year.[5]

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:

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

Y_t denotes share of loans in newly issued debt during year t or the year-over-year change in the structure of existing debt. The main regressor is the difference in loan fund flows and bond fund flows, which we lag by one quarter. For controls, we include the annual amount of Treasury bond issuance to account for the well-established gap-filling channel of bond issuance (Greenwood et al., 2010; Badoer and James, 2016), macroeconomic variables including GDP growth and CPI inflation (Chen et al., 2021), and changes in risk-free interest rates and credit spreads. All variables are scaled to have unit standard deviation, so the regression can be easily interpreted as a horse race among the regressors. We use Newey-West standard errors to account for serial correlation in the error term induced by using overlapping annual periods.

The results are shown in Table 2 and confirm that, even when we include a large set of controls, the relative flow 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. Since all independent variables are scaled to have unit standard deviation, we can directly compare them with one another, and relative loan versus bond fund flows lead the horse race against established

[5] Xu (2017) show that most speculative-grade firms refinance their bonds multiple years before maturity.

explanatory variables such changes in government debt maturity (Greenwood et al., 2010) and macroeconomic conditions (Chen et al., 2021).

We conclude this section by speculating on the primary factor that drives aggregate flows into and out of loan funds and bond funds. Existing literature shows that mutual fund investors chase past returns (e.g. Ben-David et al., 2021), so monetary policy cycles are an important determinant of fixed income mutual fund flows (Brooks et al., 2018; Fang, 2023; Cetorelli et al., 2023). During monetary easing, for example, long-duration bonds increase in value much more than floating-rate loans, which mechanically pay less interest when rates decrease, and as a result, return-chasing investors flow into bond funds and out of loan funds. Figure A2 shows evidence consistent with this view.

3.2 Firm-Specific Fund 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 other latent macroeconomic variables drive the simultaneous movement of fund flows and debt structure changes. In this subsection, we exploit firm-specific fund 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 mutual 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 funds respond to inflows or outflows by nearly proportionally scaling up or down their existing holdings. We confirm this behavior by running the following regression:

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

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 portfolio 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 mutual 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 $t+h$ as:

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

where $i \in L$ and $i \in B$ denote, respectively, the set of loan funds and the set of bond funds, $DebtHeld_{i,j,t}$ is the amount of firm j's debt held by fund i at time t, $FlowFlow_{i,t,t+h}$ is the ratio of fund i's flows from time t to $t+h$ scaled by its size, and $DebtOutstanding_{j,t}$ is firm j's total debt outstanding. Intuitively, this measure captures the amount of buying or selling by a 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 fund flows can be treated as exogenous shocks to credit supply, akin to the canonical shift-share instrument (Goldsmith-Pinkham et al., 2020). In the typical 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 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 fund 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:

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

where $Y_{j,t,t+4}$ 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 fund flows from loan funds and bond funds defined in the previous subsection. Controls include the log of total assets, the ratio of cash to total assets, 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 somewhat economically meaningful, 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 flows (bond flows) 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). Since almost all loans are floating-rate and almost all bonds are fixed-rate, these loan flows and bond flows lead to large changes in firms' interest rate structure. Columns 2 shows that a 1 p.p. higher loan flow (bond flow) is associated with 0.69% higher (1.05% lower) floating-rate ratio. Column 3 shows that the estimates remain virtually unchanged when we expand the definition of floating-rate debt to debt that is maturing and therefore will be repriced within one year. Column 4 shows similar results when we instead focus on Macaulay duration.[6] These effects are all highly statistically significant and economically meaningful in magnitude.

To further understand the explanatory power of fund flows on debt structure changes, we compare fund flows with other control variables in a horse race. To do so, we standardize the explanatory variables so that they all have unit standard deviation. The results are show in A1. Interestingly, most of the control variables have statistically insignificant effects on debt structure changes. Even though the control variables have been shown by existing literature to have important effects on the *level* of debt structure, they have little effect on *changes* in debt structures, especially when including fixed effects at the firm, rating and industry level. Fund flows remain as the only variables that correlate with debt structure changes in a statistically significant way.

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 newly issued loans and on a sample

[6] For floating-rate debt, we define its Macaulay duration to be zero

of newly issued bonds:

$$OfferingSpread_j = LoanFlow_{j,t-4,t} + BondFlow_{j,t-4,t} + \gamma Controls + FE + \epsilon_j$$

$OfferingSpread_j$ is the spread over LIBOR for loans and the spread over a duration-matched Treasury bond yield for bonds. $LoanFlow_{j,t-4,t}$ and $BondFlow_{j,t-4,t}$ are, respectively, flows to issuer j's existing loan fund investors and bond fund investors during the one year prior to the issuance date t. Controls include loan or bond characteristics (years to maturity, the log of the issuance amount) and issuer characteristics (credit rating, the log of total assets, the ratio of cash to total assets, 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. Notably, loan flows do not have a significant effects on bond offering spreads, and bond flows do not have an impact on loan offering spreads. This evidence helps confirm our hypothesis that larger loan flows leads to more issuance of loans relative to bonds because of an increase in supply tht lowers the 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.

The pricing results corroborate our interpretation 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 increase its demand for loans relative to bonds, which leads to fund managers to acquire more flows to meet the demand. If this were the case, then we should observe an *increase* in the firm's loan spread. The fact that we find the opposite – loan fund flows lead to more loan borrowing and lower spreads – reassures that the behaviors are driven by investor supply rather than firm demand.

The pricing results also support the interpretation that flow-induced debt structure changes reflect rational decision-making by firms. Firms optimally tilt towards floating-rate loans when loan fund flows lead to lower costs for loans relative to bonds, and vice versa when bond fund flows make fixed-rate bonds more attractive. These flow-induced debt structure changes are certainly not cost-free, as they represent deviations from firms' natural debt structure, which can create risk exposure to changes in interest rates, as we explore in the next section. However, an optimizing firm would still respond by adjusting its debt structure, balancing the trade-off between *immediate* cost of capital savings and exposure to *future* risks.

4 Debt Structure Changes and Monetary Policy Transmission

In this section, we utilize our findings above on mutual fund flows to re-visit the effect of debt structure on firm sensitivity to monetary policy. The recent interest rate hike serves as a nice illustration of problem. 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.

More importantly, increase in interest expenses would weaken the firm's balance sheet, making it harder to raise new capital. This is known as the financial accelerator effect (Bernanke and Gertler, 1995), and there is ample evidence that these financial accelerator effects are large, particularly for firms that are financially constrained, such as the speculative-grade firms that we focus on. The challenge is therefore to quantify the full effect of debt structure on monetary policy transmission, with financial accelerator channels accounted for.

Existing literature analyzes this question using raw observed debt structure (Ippolito et al., 2018; Gürkaynak et al., 2022; Jungherr et al., 2022), which is an endogenous object. As demonstrated in Chen et al. (2021), firms may choose a higher floating-rate ratio in order to *offset* interest rate sensitivity in other parts of their balance sheets – for example, their cash flows on the asset side may have become more positively correlated with interest rates. Indeed, Figure A4 shows evidence that floating-rate ratios are predictably higher (lower) for more (less) pro-cyclical industries such as durable goods (public utilities), which may not benefit or loss from rate hikes because their revenues co-move more (less) with interest rates.

Another endogeneity concern relates to the use of interest rate swaps. Some firms, particularly constrained ones, face more frictions derivatives usage (Cenedese et al., 2020). Less constrained firms, because of their better access to interest rate swaps, may choose to borrow more in floating-rate debt. As a result, more floating-rate debt does not necessarily mean higher interest rate exposure because the debt could be entirely hedged.

These endogeneities do not matter if they can be perfectly controlled for. However, many of these variables can be more difficult to observe. For example, to measure derivatives usage, existing literature use a dummy variable indicating whether the words "interest rate swap" ever appear in 10K or 10Q (Ippolito et al., 2018; Gürkaynak et al., 2022). As another 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 fund 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. Section 3.3 has shown evidence that the relevance of this instrument is strong.

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

$$Y_{j,t,t+4} = \beta \Delta FFR_{t,t+1} \times \Delta FloatingRatio_{j,t-8,t} + \gamma Controls + FE + \epsilon_{j,t} \tag{5}$$

$Y_{j,t,t+4}$ denotes year-over-year capital expenditure (CAPX), interest expense (XINT), net equity issuance (NEI) or net debt issuance (NDI) from quarter-end t to quarter-end $t+4$. $\Delta FFR_{t,t+1}$ 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. $\Delta FloatingRatio_{j,t-8,t}$ 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. We control for log total assets, cash ratio, Tobin's Q and leverage measured at quarter-end t and contemporaneous profitability measured over the same window as the dependent variable. 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.

Instead of just running the regression through Ordinary Least Squares (OLS), we also run Two-Stage Least Squares where we instrument for $\Delta FloatingRatio_{j,t-8,t}$ with contemporaneous loan flows and bond flows $LoanFlow$ and $BondFlow$ in the first stage. 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).[7] This relevance of this instrument should not come as a surprise given our analyses in Section 3.3.

Column 1 of Table 6 shows the ordinary least squares (OLS) estimates of 5, 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 Table 6 reports the two-stage least squares estimates. 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 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 mutual 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

[7] 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.

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 5 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.

4.1 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 τ):

$$Return_{j,\tau} = \beta NS_{\tau} \times FloatingExposure_{j,\tau} + \gamma Controls + \epsilon_{j,\tau} \tag{6}$$

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 changes 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 impact of debt structure on monetary policy transmission is much stronger than what prior studies suggest.

4.2 Aggregate implications

Using our IV estimates in the previous section, we do a back-of-the-envelop quantification of the effect of debt structure on aggregate capital expenditures during the recent interest rate hike. From year-end 2021 to year-end 2023, the Fed conducted one of the most aggregate interest rate hikes in history, and the federal funds rate increased from near zero to over 5 percentage points. As we have demonstrated above, this rate hike should particularly affect firms with floating-rate debt, directly due to higher interest expenses and indirectly due to the financial accelerator channels.

To quantify the effect of debt structure, we conduct the following counterfactual exercise: suppose all of the floating-rate corporate debt was switched to fixed rate, how much would aggregate capital expenditures have changed during the recent 5-percentage-point rate hike? This is given by the following formula:

$$\sum_j 0.179 \times 5 \times FloatingRatio \times TotalAssets/100 \tag{7}$$

where 0.179 comes from Column 2 of Table 6. This number would be the contribution of debt structure to monetary policy transmission to real activities. The switch would make little difference to the large public investment-grade firms who already borrow fixed-rate debt. The switch would affect a lot of the public speculative-grade firms, which borrow both floating-rate loans and fixed-rate bonds depending on market conditions. This switch should also affect most of the private firms that rely on banks for funding, since most bank loans are floating rate.

For public firms which we directly observe their total assets and debt structure, the exercise is straightforward. For example, American Airlines Group Inc's floating-rate ratio was 23.46% at year-end 2021. Applying the formula in Equation 7, its capital expenditure would have been higher by 2.09% of total assets, or $1.3 billion, if all of its floating-rate debt was switched to fixed rate instead.

For private firms, we infer their total assets as following. Based on Financial Accounts of the United States, Balance Sheet of Nonfinancial Corporate Business, the total assets of all firms was $44.2 trillion at year-end 2021. Based on data from Compustat, the total assets of all public firms was $37.6 trillion at year-end 2021. This means that the total assets of all private firms was $6.6 trillion at year-end 2021. For simplicity, we assume that all private firms borrow only in floating-rate bank loans. Therefore, they would switch from 100% to 0% floating-rate ratio.

Applying Equation 7 to all public and private firms, we derive that aggregate capital expenditures would have been higher by $0.96 trillion, or 17% higher than realized capital expenditures, during the interest rate hike from 2021 to 2023, if all firms had fixed-rate debt instead of floating-rate debt. This number would have been substantially lower at $0.08 trillion, or 1.32% of realized capital expenditures, if we apply the OLS estimate of 0.014 instead of the IV estimate of 0.179. Assuming that our estimate is correctly identified, our results imply that the debt structure channel is of first-order importance for the transmission of monetary policy to aggregate real activities.

5 Conclusion

The structure of firms' existing debt has an important effect on their exposure to future changes in monetary policy rates. In this paper, we exploit the recent rise of fixed income mutual 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 exposure into their policy-making decisions. Moreover, our results indicate a new path dependency in monetary policy transmission. Existing research such as Fang (2023); Cetorelli et al. (2023) shows that monetary policy can influence the relative flows into bond funds and loan 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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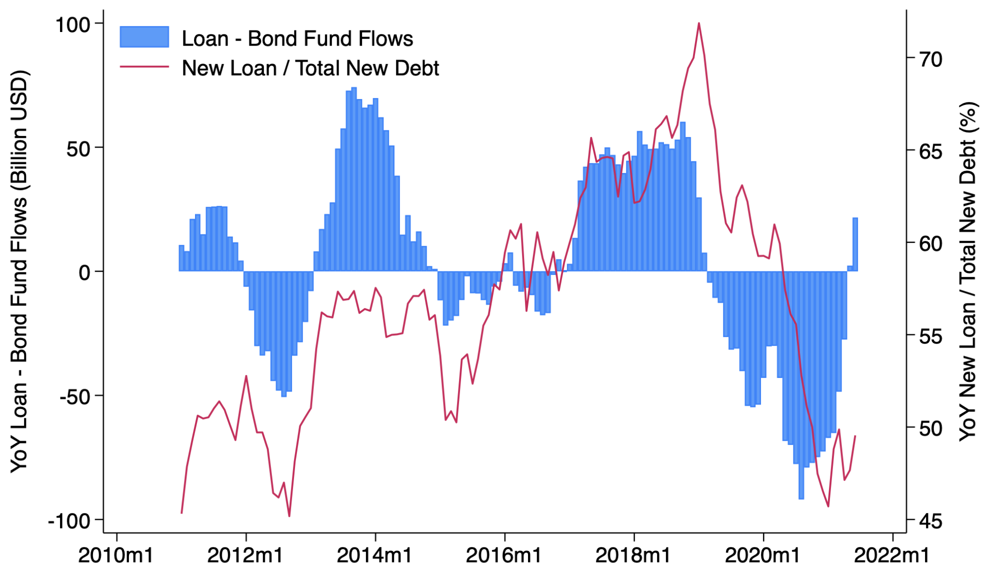
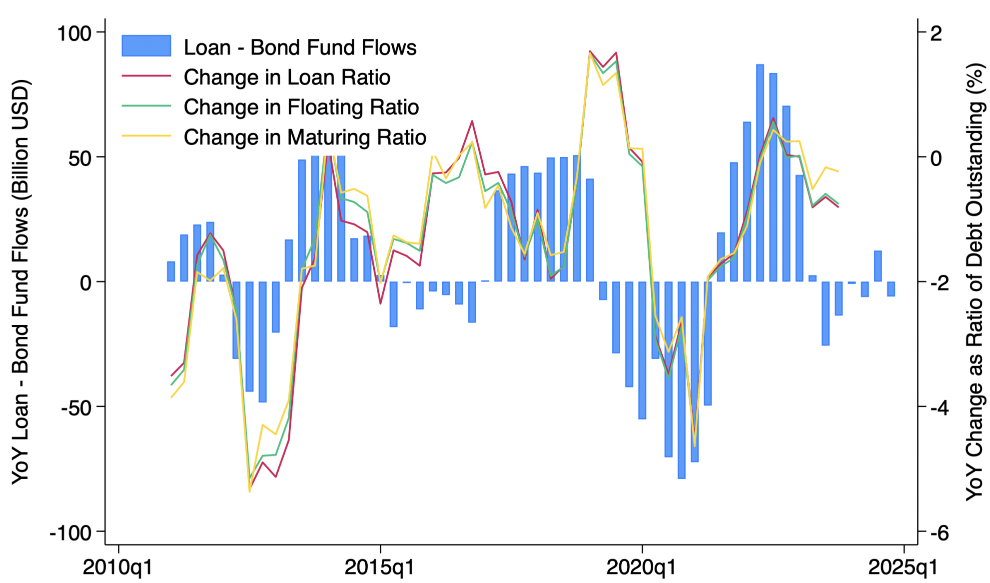
Figures

Figure 1: **Mutual Fund Flows and Corporate Debt Structure, Aggregate Time Series.** These figures show fixed income mutual 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 repricing debt (floating-rate or maturing within one year) relative to total debt outstanding.

Panel A: New Debt Issuance



Panel B: Total 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 $MaturingDebt/TotalDebt$ are amount of debt that is loan, floating-rate, and maturing (floating-rate or maturing within one year) 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 can be directly compared in a horse race.

Dependent Variable	New Loan / Total New Debt (%)	Change in Loan Debt / Total Debt (%)
	(1)	(2)
Lagged Loan – Bond Fund Flow	3.552***	1.098**
	(6.592)	(3.307)
ΔTreasury Debt Maturity	-3.611***	-0.307
	(-6.934)	(-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	51
R2	0.772	0.416

Table 3: **Fixed Income Mutual 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 (1)	Portfolio Bonds (2)	All Loans (3)	Portfolio Loans (4)
Fund Inflow (%)	0.92*** (21.83)	0.69*** (10.95)	0.08*** (4.23)	0.02*** (2.95)
Fund Outflow (%)	0.96*** (7.14)	0.74*** (6.01)	0.04*** (3.60)	0.02* (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 (1)	Portfolio Bonds (2)	All Loans (3)	Portfolio Loans (4)
Fund Inflow (%)	0.11*** (3.82)	0.05* (1.99)	0.84*** (25.94)	0.57*** (12.63)
Fund Outflow (%)	0.11** (2.62)	0.09 (1.50)	0.79*** (6.96)	0.55*** (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 Fund 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 maturing debt (floating-rate or maturing within one year) relative to total debt outstanding. Panel B also examines Macaulay duration of 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	ΔRepricing Ratio	ΔMacaulay Duration
	(1)	(2)	(3)	(4)
Loan Flow (%)	0.688***	0.685***	0.686***	-0.107***
	(4.005)	(3.962)	(3.960)	(-3.093)
Bond Flow (%)	-1.088***	-1.052***	-1.056***	0.185***
	(-4.429)	(-4.319)	(-4.311)	(3.989)
Controls	Log Total Assets, Cash Ratio, Tobin's Q, Leverage, Profitability			
Firm FE	Y	Y	Y	Y
Quarter FE x Rating FE	Y	Y	Y	Y
Quarter FE x Industry FE	Y	Y	Y	Y
Standard Errors	Clustered by Firm and by Quarter			
Observations	31019	31019	31019	31019
R2	0.133	0.133	0.133	0.121

Table 5: **Firm-Specific Fund 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 Sensitivity to Monetary Policy.** 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. The dependent variables are year-over-year capital expenditure (CAPX), interest expense (XINT), net equity issuance (NEI) and net debt issuance (NDI) from quarter-end t to quarter-end $t+4$. t-statistics are reported in parentheses. *, **, and *** denote p-values less than 0.10, 0.05, and 0.01, respectively.

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

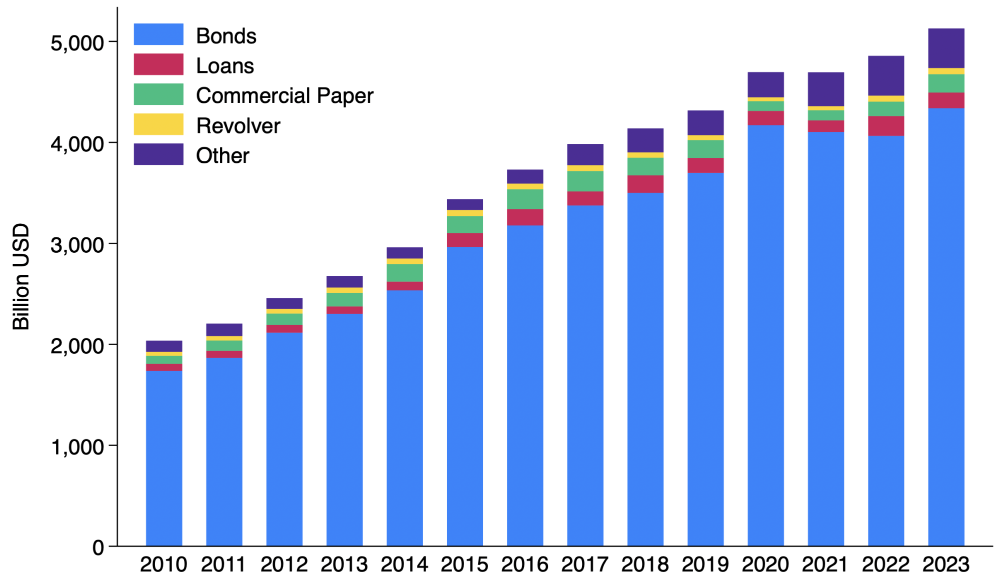
Table 7: **Flow-Induced Debt Structure Changes and FOMC Announcement Returns.** The table examines the cross-sectional relationship between flow-induced debt structure changes and stock return sensitivity to interest rate shocks during two-day windows around FOMC announcements, according to regression (6). 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

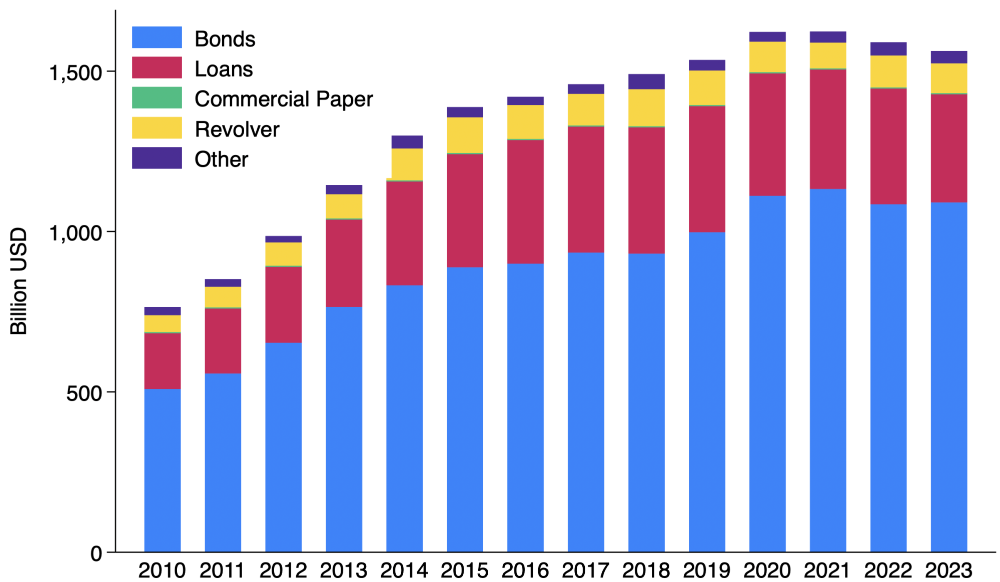
Appendix A Additional Figures

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

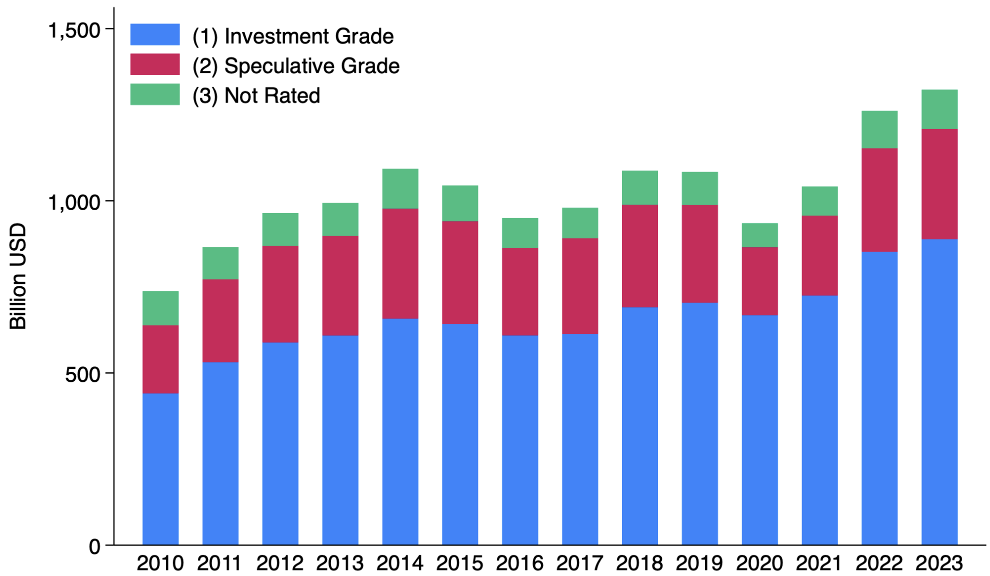
Investment-Grade Firms, Debt Composition



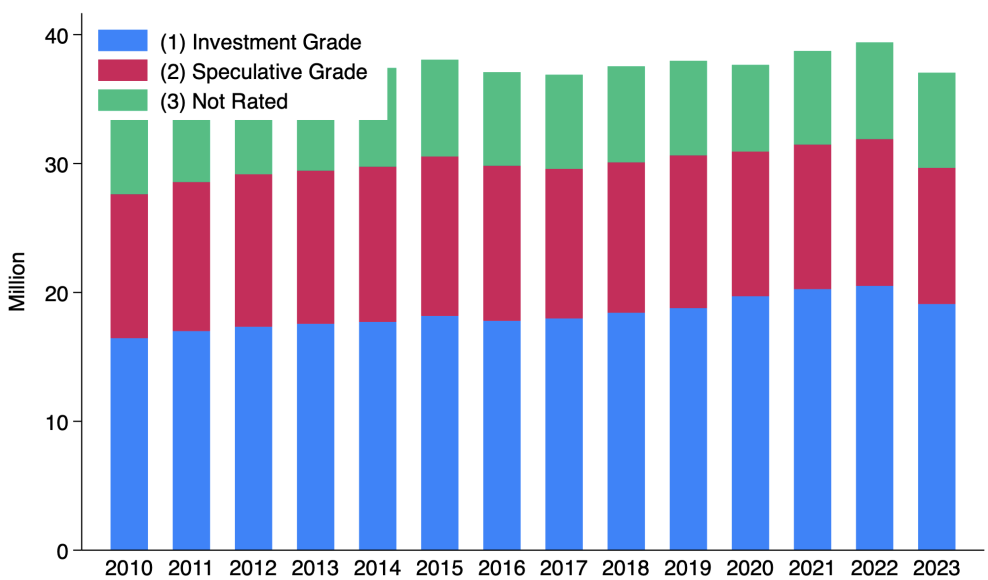
Speculative-Grade Firms, Debt Composition



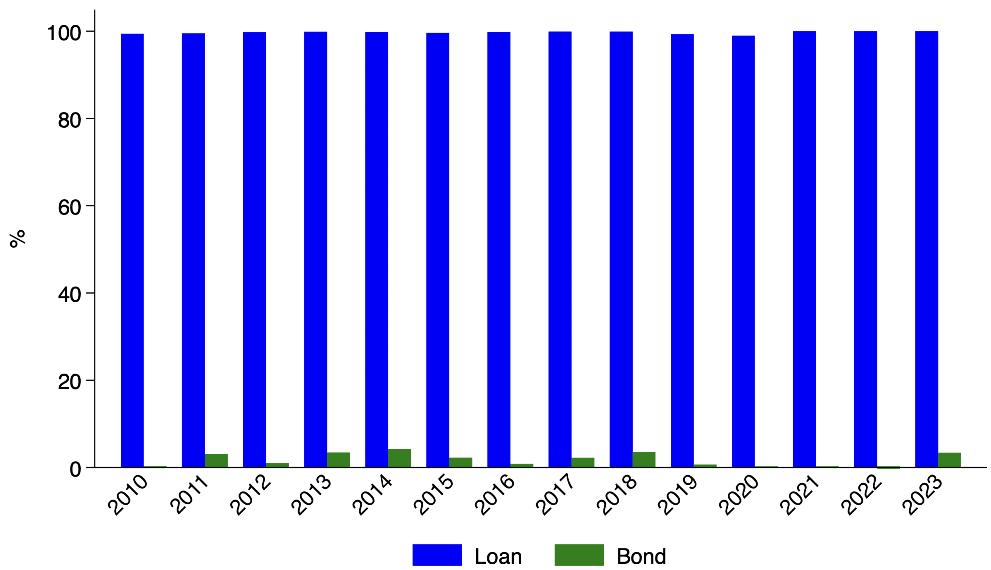
Aggregate Capital Expenditure



Aggregate Employment



Floating-Rate Share, Bonds vs Loans



Speculative-Grade Bonds, Investor Composition

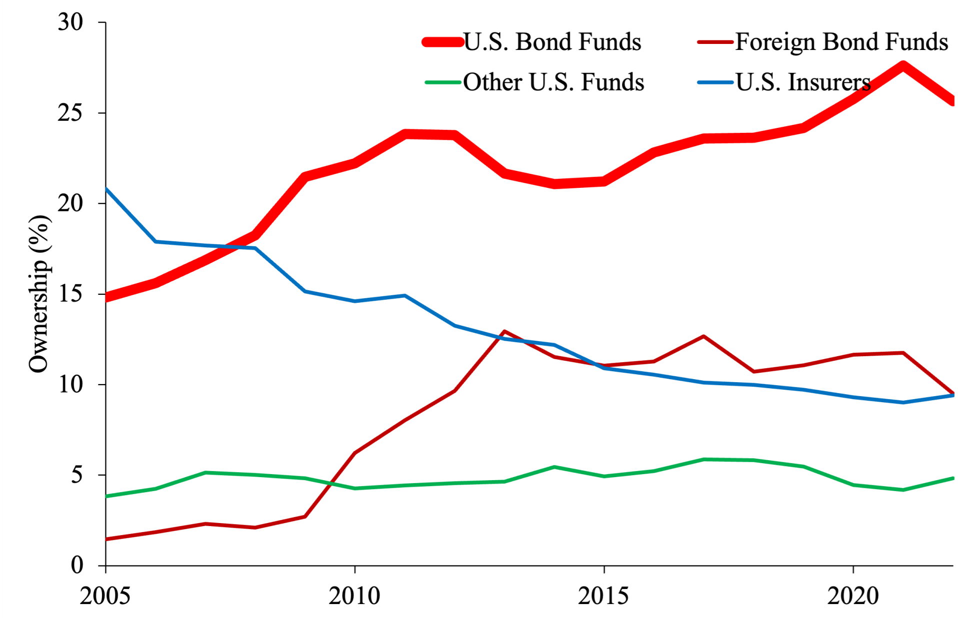
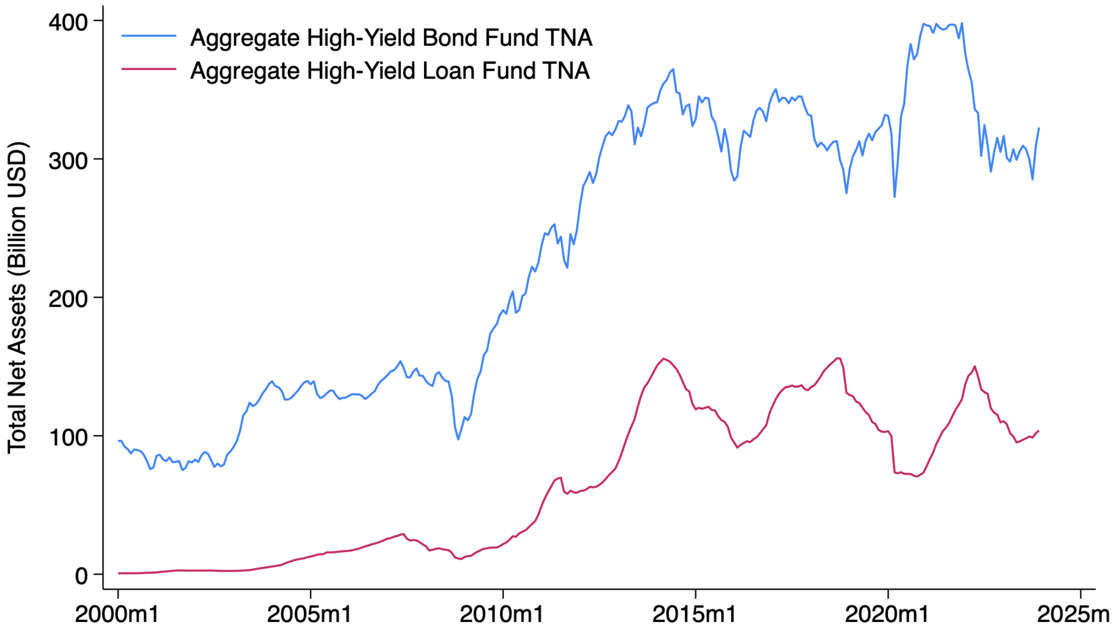


Figure A2: **Aggregate Bond Funds and Loan Funds.**

Aggregate Fund Size



Aggregate Fund Flows

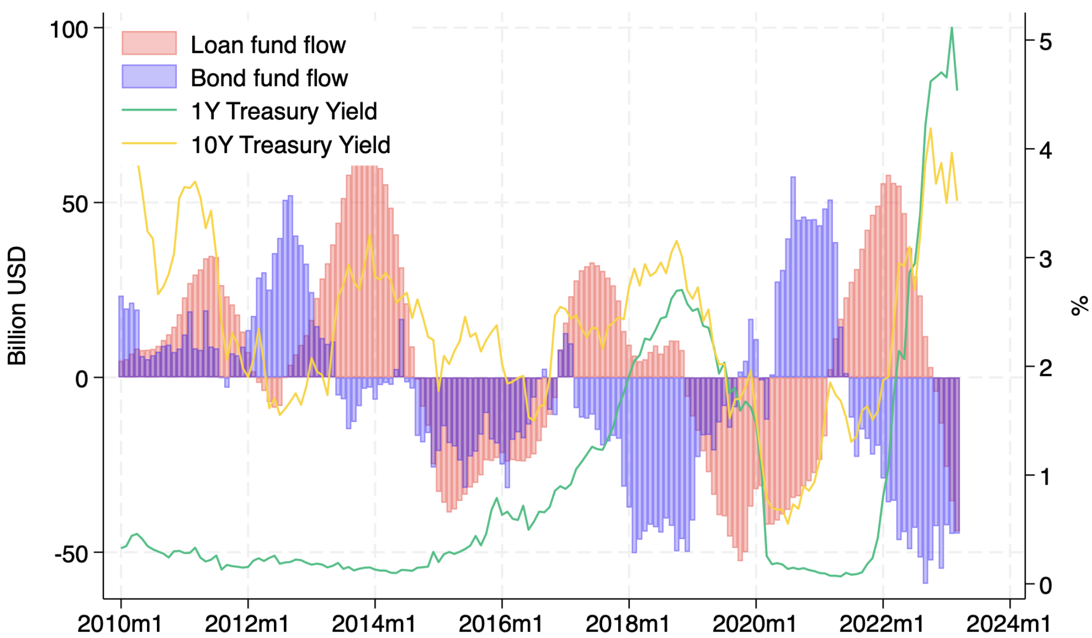


Figure A3: **Fund Flows and Corporate Debt Macaulay Duration, Aggregate Time Series.**

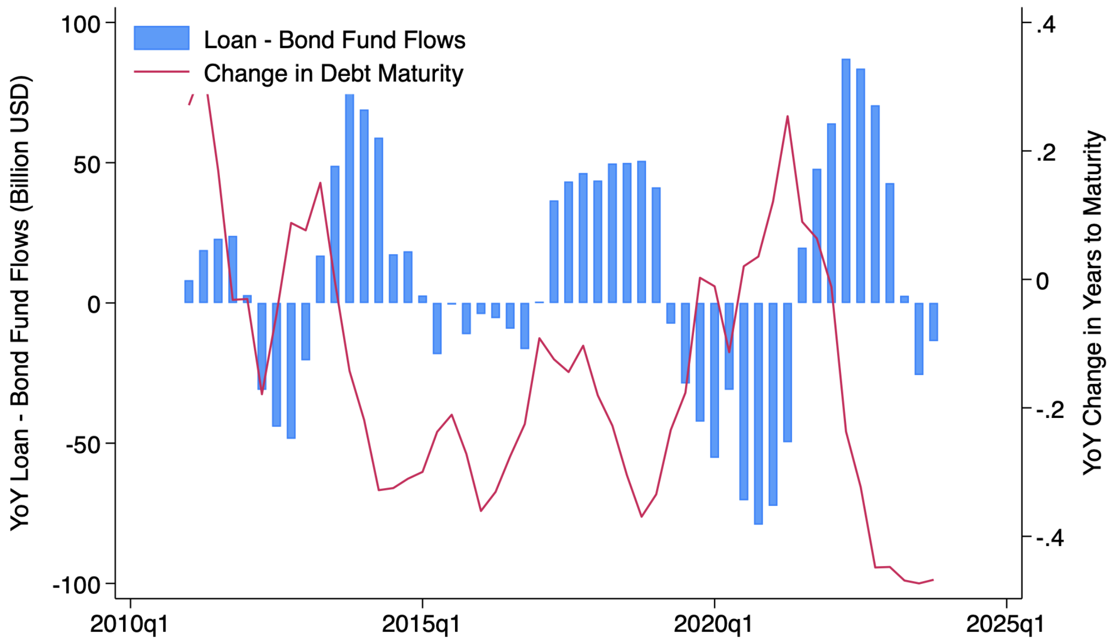
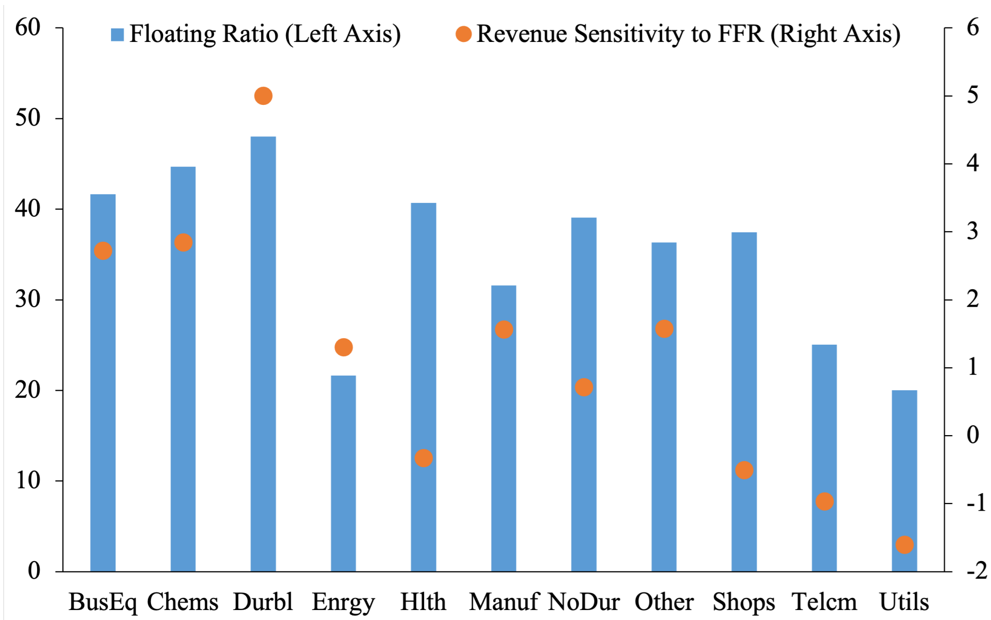


Figure A4: **The Endogeneity of Floating-Rate Ratio.** This figure illustrates the endogeneity of floating-rate ratio with respect to asset cash flow. It shows, for each of the Fama-French 12 industries, the weighted average floating-debt ratio (blue bars) and the weighted average revenue sensitivity to federal funds rate (orange dots).



Appendix B Additional Tables

Table A1: **Firm-Specific Fund Flows and Debt Structure Changes, Horse Race.** These tables are identical to those in Table 4 except that: 1) coefficients on the control variables are also displayed, and 2) all variables are standardized to have unit standard deviation. Therefore, the coefficients can be directly compared to one another in a horse race.

Panel A: New Debt Issuance

Dependent Variable	New Loan / Total New Debt (%)				
	(1)	(2)	(3)	(4)	(5)
Loan Flow	1.514***	1.682***	1.997***	1.471***	1.771**
	(4.026)	(3.965)	(4.261)	(3.402)	(3.640)
Bond Flow	-2.074***	-1.617***	-1.524***	-1.687***	-1.628***
	(-6.964)	(-5.636)	(-4.757)	(-5.933)	(-5.130)
Log Total Assets	-11.093***	-4.251*	-4.516*	-3.242	-3.142
	(-4.554)	(-1.715)	(-1.874)	(-1.210)	(-1.187)
Cash / TA	-2.826	-1.241	-1.296	-0.906	-0.642
	(-1.617)	(-0.763)	(-0.832)	(-0.579)	(-0.462)
Debt / TA	-2.480	-1.542	-2.266	-1.401	-1.911
	(-1.447)	(-0.899)	(-1.163)	(-0.730)	(-0.949)
Net Income / TA	-0.695	0.404	0.721	0.554	1.021
	(-0.524)	(0.326)	(0.546)	(0.375)	(0.722)
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	ΔMaturing Ratio	ΔMacaulay Duration
	(1)	(2)	(2)	(4)
Loan Flow	0.709***	0.706***	0.707***	-0.110***
	(4.005)	(3.962)	(3.960)	(-3.093)
Bond Flow	-0.806***	-0.779***	-0.782***	0.137***
	(-4.429)	(-4.319)	(-4.311)	(3.989)
Log Total Assets	-0.079	-0.843	-0.958	0.426
	(-0.133)	(-1.148)	(-1.252)	(0.943)
Cash / TA	0.675***	0.862***	0.476	-0.122
	(2.792)	(2.740)	(1.578)	(-1.046)
Debt / TA	-0.017	-0.420	-0.327	0.233
	(-0.050)	(-0.949)	(-0.729)	(0.425)
Net Income / TA	-0.078	-0.122	-0.186	0.092
	(-0.538)	(-0.994)	(-0.321)	(0.451)
Firm FE	Y	Y	Y	Y
Quarter FE x Rating FE	Y	Y	Y	Y
Quarter FE x Industry FE	Y	Y	Y	Y
Standard Errors	Clustered by Firm and by Quarter			
Observations	31019	31019	31019	31019
R2	0.133	0.133	0.133	0.121

Table A2: **Firm-Specific Fund Flows and Debt Structure Changes, Robustness.** These tables are similar to those in Table 4 but have variations in specifications and fixed effects.

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

Table A3: **Firm-Specific Fund Flows and Firm Sensitivity to Monetary Policy.** These tables examine the cross-sectional relationship between firm-specific fund flows and firm sensitivity to changes in federal funds rates. t-statistics are reported in parentheses. *, **, and *** denote p-values less than 0.10, 0.05, and 0.01, respectively.

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

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 ($CAPX$)