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Abstract

Loan funds are open-end mutual funds holding predominantly corporate leveraged loans. We document empirically that loan funds are significantly more susceptible to run risk than any other category of debt funds, including corporate bond funds. Most importantly, we establish a link between loan funds' flows and monetary policy, based on the institutional characteristics of their portfolio holdings. We find robust evidence indicating a pro-cyclical relationship between monetary policy and loan-fund flows. This relationship, however, is asymmetric: weaker for policy-rate increases and stronger for policy-rate decreases. Finally, the effect of monetary policy shocks on loan-fund flows also depends on the level of market short-term rates, suggesting that it is not only the direction of the monetary policy change that matters, but also the level of the policy rate at the time of the change. Our results thus identify a novel channel of monetary policy transmission affecting a critical segment of the credit sector, represented by leveraged lending.

Key words: mutual funds, monetary policy, leverage lending

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1 Introduction

Open-end mutual funds have become increasingly important financial intermediaries, and the volatility of their investors' flows can have major repercussions for financial stability (Federal Reserve Board, 2021). Bond funds, in particular, have been shown to be exposed to run risk due to the illiquidity of their holdings (Goldstein et al., 2017) and their flows to be particularly sensitive to monetary policy shocks (Feroli et al., 2014). In this paper, we focus on bank-loan funds, an important category of bond mutual funds whose growth over the last decade has outpaced that of bond funds (see Figure 1). Loan funds are also open ended but differ from bond funds in two important ways. First, they hold corporate loans, which are significantly less liquid than corporate bonds, including those bonds rated below investment grade. Second, corporate loans are floating rate securities and are more prone to renegotiation, two features that expose loan funds to monetary policy in more nuanced ways.

We find empirical evidence suggesting that loan funds, which are key credit providers in the leveraged lending market, are much more vulnerable to run risk than any other category of debt mutual funds. Building on the institutional features of their asset holdings, we further document the role of monetary policy as a coordinating factor driving loan funds' investor flows and their volatility, suggesting a novel channel of monetary policy transmission.

Loan funds invest predominantly in leveraged loans. While banks used to be the dominant providers of leveraged lending, the market is now dominated by non-bank financial institutions, with loan funds being the largest holders of leveraged loans after collateralized loan obligations (CLOs) and representing about 16% of the market at its peak in 2018 (Blackrock, 2019).[1]

The open-end nature of loan funds allows investors to redeem their shares on

[1]Leveraged loans, in turn, account for a sizable share of lending to non-financial corporations, amounting to about 50% of total commercial loans, and they are typically used to finance important economic activity, such as mergers and acquisitions, leveraged buyouts, business recapitalizations, and business expansions.

demand and, combined with illiquid asset holdings, gives rise to a first-mover advantage in investors' redemption decisions. The reason is that funds face liquidation costs when they readjust their portfolios in response to redemptions. Since redeeming investors get the net asset value of their shares on the day of the redemption, but the portfolio readjustments happen in the following days, redemptions impose negative externalities on the remaining shareholders. This incentive to redeem first generates a self reinforcing relation between investor outflows and poor fund performance, leading to run risk.

The first-mover advantage that one would expect to find in loan funds characterizes any investment vehicle engaging in liquidity transformation, and it is well-documented for corporate bond funds (Chen, Goldstein, and Jiang, 2010; Feroli, Kashyap, Schoenholtz, and Shin, 2014). Goldstein, Jiang, and Ng, (2017), in particular, show that bond funds exhibit a concave flow-performance relationship: their outflows are sensitive to bad performance more than their inflows are sensitive to good performance.

The liquidity fragility of loan funds, however, has a fundamentally distinct nature, which is driven by the features of the loan contracts held on their balance sheets. In particular, besides being more illiquid than bonds due to their specific trading arrangements, leveraged loans are typically highly bespoke, complex contracts, which renders them opaque and therefore hard to monitor. The heightened challenges in assessing the underlying value of these debt securities relative to bonds should lead loan-fund investors to display higher sensitivity to fund performance in bad times.[2] We conjecture, therefore, that loan-fund investors are, on average, more sensitive to the performance of their funds than bond-fund investors, and that this higher sensitivity occurs when fund returns are in negative territory.

We find evidence consistent with this prior. Investor flows in loan funds positively depend on past fund performance, and this sensitivity is between four and five times higher than that of investor flows in corporate bond funds. Moreover, the higher

[2]Dang et al. (2015) and Holmstrom (2015) show how opaque debt-like contracts can become highly sensitive to information following bad news on the underlying asset.

flow sensitivity of loan funds only occurs when fund returns are negative; that is, the flow-performance relationship of loan funds is more concave than that of bond funds, indicating that loan funds are even more prone to disruptive run-like episodes than bond funds.

Importantly, not only do individual loan funds face a higher run risk than individual bond funds, but we also show that their aggregate flows are more volatile, which suggests greater exposure to a common factor. Monetary policy is a natural candidate to impact loan funds' performance and, by extension, investor flows in this industry. The reason is that, whereas standard bonds are fixed-income securities, leveraged loans are floating coupon contracts, tied to the behavior of a reference rate, typically the LIBOR. Loan rates reset on a recurrent basis, normally between thirty and ninety days. As a result of this institutional feature of their portfolio holdings, loan funds' income stream is expected to improve when LIBOR increases and to deteriorate when LIBOR decreases. This creates an *interest rate channel* whereby policy rate increases should be associated with net flows into loan funds and vice versa.[3]

Our strategy to identify the effect of monetary policy on fund flows has four components. First, to control for the overall effect of monetary policy on corporate debt markets, we compare loan-fund flows to the flows in corporate bond funds. Moreover, to control for the high credit risk of loan funds, our baseline specifications restrict the control group to high-yield bond funds, which have a similar credit-risk profile. Second, to identify monetary policy shocks, we use the measures of policy surprise introduced by Swanson (2021). The empirical results of our baseline specification are consistent with our prior: we identify a positive relationship between monetary policy shocks and flows in loan funds relative to bond funds. This relationship is robust to using all corporate bond funds as control group and to controlling for a possible differential effect of market

[3]This interest rate channel in loan funds goes in the opposite direction of what we would normally presume for traditional bond funds; in fact, an interest rate increase (decrease) would be reflected in a valuation loss (gain) for the fixed-income securities in bond funds' portfolios, suggesting a negative relationship between interest rate movements and bond-fund flows.

volatility on investor flows across different fund types as well as for the duration of fund portfolios.[4]

Third, to strengthen our identification, we exploit another unique institutional feature of leveraged loans, which suggests that the effect of monetary policy on loan-fund flows is likely *asymmetric* for positive and negative monetary policy surprises. The reason is that, in contrast to bond borrowers, loan borrowers can *renegotiate* their loans, demanding better terms when their economic conditions improve. This institutional feature has implications for the link between loan-fund flows and monetary policy, as policy rates typically increase in response to improving macroeconomic conditions (Smolyansky and Suarez, 2021). As a result, a monetary policy tightening could be asssociated with a decrease of the income stream of loan funds due to loan renegotiations triggered by improving economic conditions. Hence, for loan-fund investors, the potential benefits of a positive monetary policy shock through the interest rate channel described above may be dampened by this renegotiation channel.

Importantly for our identification purposes, the renegotiation channel is not at work when economic conditions deteriorate. In this case, borrowers have no incentive to renegotiate their loans and instead benefit from the "more favourable" terms of their existing loans. Thus, while we expect the interest-rate channel to be counteracted by the renegotiation channel when monetary policy surprises are positive, we do not expect a counter effect when surprises are negative.

Our empirical evidence confirms this second hypothesis: negative monetary policy surprises lead to significant outflows in loan funds relative to bond funds, whereas positive surprises have no significant effect. This result holds both when loan funds are compared only to high-yield bond funds and when they are compared to all corporate bond funds, and it is robust to controlling for possible differential effects of market

[4]We want to control for portfolio duration because the differential effect of monetary policy on fund flows could be due to its effect on bond valuation rather than through the rate-reset feature of leveraged loans, and portfolio duration is a good proxy for the interest-rate risk of bonds.

volatility on investor flows across different fund types

Finally, the last component of our identification strategy capitalizes on a unique development in the leveraged-loan market during our sample period: the introduction of interest rate floors. Floor clauses state that the loan rate does not reset when the reference rate (LIBOR) is below a certain threshold. This suggests that the interest rate channel should be stronger when the *level* of short-term rates, to which reference rates are typically tied, is close to or higher than the prevailing rate floors.

Our empirical results confirm this hypothesis. Exploiting times series variation in our panel, we show that the positive effect of monetary policy shocks on loan-fund flows is significantly stronger when reference rates are above typical floors for leveraged loans or when they move away from the zero-lower bound (ZLB).

Our paper contributes directly to the literature on mutual fund fragility (Chen, Goldstein and Jiang, 2010; Feroli, Kashyap, Schoenholtz and Shin, 2014; Goldstein, Jiang and Ng, 2017). In particular, our findings are consistent with Chen, Goldstein and Jiang (2010) and Goldstein, Jiang and Ng (2017), who document that portfolio illiquidity exacerbates the strategic complementarities among investors in open-end bond funds, exposing them to run risk. Our results, however, differ from these works as we focus on loan funds and tie the fragility of their flows to the specific institutional characteristics that distinguish leveraged loans from bonds and other fixed-income securities.

Perhaps more importantly, our paper contributes to the emerging but still small literature linking monetary policy with non-bank financial intermediaries. Stein (2012) argues that monetary policy is a sufficient tool to insure financial stability when regulated banks are the only financial intermedaries, but it becomes insufficient in more complex systems where intermediation is also provided by non-bank entities.

Consistent with this view, Feroli, Kashyap, Schoenholtz, and Shin (2014) point at a destabilizing role of monetary policy on open-end bond-fund flows, describing how forward guidance could lead to an acceleration of outflows around interest rate hikes, especially after prolonged periods near the ZLB, as it happened during the "taper tantrum" of 2013 (see also Stein, 2014). Such response in bond funds to tightening in monetary policy is also documented by Banegas *et al.* (2016). Our results, however, show a more nuanced relationship between monetary policy and fund flows, with the category of loan funds subject to an acceleration of outflows in response to *expansionary* surprises, and with countervailing effects during periods of tightening.

Our results are important for at least two additional reasons. First, our evidence on the positive link between monetary policy and loan-fund flows suggests a pro-cyclical impact of monetary policy in the leveraged lending market and a novel channel of transmission of monetary policy in the broad space of open-end funds. Since loan funds are the second most important funding source of leveraged lending, anything that makes their size volatile has potentially meaningful real effects. The reason is that, following a negative monetary policy shock that leads to a contraction of the loan-fund industry, it might be difficult for leveraged borrowers to find alternative investors in the short term. Moreover, most borrowers in the leveraged-loan market are unlikely to replace leveraged loans with alternative funding sources, coming from either the banking sector or the bond market.

Second, our results also have important implications for financial stability. Although loan funds are not a dominant component of the entire open-end fund industry, disruptions in the loan-fund segment could easily propagate to the rest of the corporate-debt mutual fund sector. One reason is that sudden loan-fund outflows could work as a negative "signal" to investors in corporate bond funds, especially those holding securities issued by corporations that also rely on leveraged loans and those belonging to fund families that also offer loan funds.[5] Another reason is that flow dislocations in loan funds may trigger fire sale dynamics, affecting other leveraged loan investors, such as

[5]For example, in the context of banks, Chen (1999) shows that the release on information on a bank can trigger runs not only by its depositors but also by depositors of other banks. In the context of money market funds (MMFs), Cipriani and La Spada (2020) show that the March 2020 run on prime MMFs propagated from institutional (more informed) to retail (less informed) investors within the same fund family.

CLOs, hedge funds, and insurance companies, and amplify the original shock.

2 Institutional Setting and Hypotheses

2.1 Loan fund industry

There is no exact definition of what constitutes a leveraged loan, nor is there a specific classification that is used for monitoring and regulatory purposes. Broadly speaking, leveraged loans are dominated by term loans (as opposed to credit lines) that carry a significant amount of risk of default (Kim *et al.*, 2018). Some market participants identify leveraged loans off the borrower's leverage; others use the loan (or borrower) rating; others rely on the purpose of the loan (i.e., loans for buyouts, acquisitions, or capital distributions); and others yet use the spread at origination (i.e., spreads above 150 or 200 bps).

The leveraged loan market represents a sizable share of the total lending to non-financial corporations. In 2020Q2, it was estimated at approximately $1.1 trillion, with total bank lending to non-financial corporates equal to about $2.7 trillion (FRB Financial Stability Report, 2020). This is the result of the rapid growth of the leveraged loan market over the last two decades. Since 1997, the average yearly growth rate of leveraged loans has been greater than 14%, compared to 4% for the rest of corporate lending. As a result of this fast-paced growth, the overall size of the leveraged loan market is currently comparable to the overall size of the high-yield bond market (IMF, Global Financial Stability Report, 2019).

While banks used to be the almost exclusive source of credit supply for leveraged loans, the market has recently seen the increasing participation of non-bank lenders. Banks funded about 70% of leveraged loans throughout the 1990s. Since then, their share has gradually shrunk and is currently at about 10% (IMF, Global Financial Stability Report, 2019). The decline in the relative importance of banks as a funding source in this market was accompanied by the rise in the importance of Collateralized Loan Obligations (CLOs) and loan funds (Santos and Shao, 2017). CLOs currently fund the lion share of leveraged loans, owning about 60% of outstanding leveraged loans.[6]

Open-end loan funds have become the other key investor in the leveraged lending market. They have grown very significantly from the end of the great financial crisis (GFC): in aggregate, their total net assets (TNA) went from about $25 billions (bn) in January 2010 to about $144 bn in April 2014, a six-fold increase (see Figure 1) over a relatively short time period. By comparison, the TNA of high-yield bond funds, a reference benchmark to loan funds for the credit quality of their investment portfolios, went from about $168 bn in 2010 to about $415 bn in 2014, a significant growth but still considerably smaller in percentage terms than that experienced by loan funds. Since 2014, the TNA of loan funds have experienced significant aggregate volatility, but these funds remain the second largest source of funding in the leveraged-lending market after CLOs (Blackrock, 2019).

2.2 Hypotheses

Leveraged loans have distinctive institutional features as does the market where they trade. We build on these features to formulate the hypotheses we investigate and to design the identification strategy we use in our analysis.

2.2.1 Loan illiquidity and loan-fund runnability

We begin by focusing on those features that uniquely affect the liquidity of leveraged loans. Leveraged loans are significantly more informationally opaque than bonds. Bonds are standardized contracts and their issuance is subject to fairly standardized disclosure requirements, which renders these instruments more homogeneous and transparent. Conversely, loans are bespoke contracts, typically with a complex covenant structure,

[6]It is worth noting that CLOs in turn depend extensively on banks and insurance companies, the two main investors in their bonds (Fringuellotti and Santos, 2021).

and with more limited disclosure of information to market participants. A 2011 report by Standard and Poor's highlights a rise in loan-price volatility in the secondary market, supporting anecdotal evidence that syndicate participants trade on private information. A number of academic studies, including Massoud *et al.* (2009), Ivashina and Sun (2011) and Bushman *et al.* (2011), have documented that investors use the private information they obtain while participating in the syndicated loan market to trade in other markets.

Informationally opaque securities are information-insensitive most of the times. When there is a shock (e.g., bad public news), however, they can become information-sensitive, which makes them less liquid and can lead to a run on the institutions holding them (Dang *et al.*, 2015; Holmstrom, 2015). This suggests that flows in loan funds are more sensitive to bad performance than those in bond funds.

A second important difference between leveraged loans and corporate bonds relates to the procedures used to trade these securities, which are very complex. Differently from standard fixed-income instruments, whose trading is based on a typical cash-to-securities exchange between the parties, the purchase and sale of a loan - or of the interests in a loan - are structured as "assignments," in which the buyer becomes the new lender (or one of the lenders) on record. That process requires the agreement of all parties involved, including the borrower and the other agents (LSTA, 2019). As a result, the settlement period associated with a loan trade can be fairly long, averaging about 10-12 days, as opposed to the 1-3 days needed for bonds (Blackrock, 2019). This institutional feature of leveraged loans makes loan funds' portfolios particularly illiquid.[7]

These differences in the trading arrangements, together with the differences in opacity highlighted above, suggest that leveraged loans are less liquid than corporate bonds (especially in bad times), leading to our first conjecture: loan funds are more exposed to run risk than bond funds because their investors face a stronger first-mover

[7] Interestingly, despite the illiquidity of such securities and the consequent liquidity risk that loan funds are exposed to, leveraged loans are permissible investments according to SEC rules and, most importantly, are not considered illiquid assets (which would constrain holdings to a low share of the total portfolio), since the definition of illiquid assets does not include a settlement test (LSTA, 2016).

advantage. Following Goldstein *et al.* (2017), we formulate this hypothesis in terms of the relationship between investor flows and fund performance.

Hypothesis 1: The flow-performance relation of loan funds is concave and more so than that of bond funds: not only their outflows are sensitive to bad performance more than their inflows are sensitive to good performance, but such difference is greater than in bond funds.

2.2.2 Floating rates, refinancing, and monetary policy

Another institutional difference between leveraged loans and bonds – related to their interest rates – makes loan funds' performance more exposed to monetary policy shocks, which explains the greater volatility of their aggregate flows relative to bond funds.

As opposed to bonds, whose rates are typically fixed, leveraged loans are floating rate instruments. The loan rate is equal to a reference rate that adjusts on a recurrent basis plus a spread that reflects the creditworthiness of the borrower. The reference rate is typically tied to the three-month LIBOR and resets every 30 to 90 days, reflecting changing conditions in short-term interest rates. For this reason, holders of leveraged loans are exposed to minimal interest rate risk, as their income stream follows the behavior of monetary policy rates. Since investors chase fund performance, we expect a positive relationship between monetary policy shocks and flows in loan funds (relative to those in bond funds) due to the floating-rate feature of leveraged loans. We refer to this effect as the interest rate channel of monetary policy on loan-fund flows.

Hypothesis 2: Monetary policy shocks have a positive effect on loan-fund flows through an interest-rate channel linked to the rate-reset feature of leveraged loans.

The income stream of loan funds, however, is also affected by other factors that may co-move with monetary policy, and in particular by borrowers' ability to refinance leveraged loans and/or renegotiate their terms. This is an important distinction with respect to bond securities, for which callable features are typically more restrictive and ownership is more diffuse. The refinancing optionality affects the expected return of a portfolio of leveraged loans over the economic cycle: during an economic boom, leveraged loan borrowers may experience an improvement in their financial conditions and a reduction in their leverage, which will give them the incentive to renegotiate the terms of their outstanding loans and ask for lower interest rates.[8] As a result, the income stream of loan funds may decrease after a positive surprise to macroeconomic conditions relative to that of bond funds, leading to investor outflows.

Since improving macroeconomic conditions tend to be associated with monetary policy tightening, refinancing activity in the leveraged-loan market will likely be positively correlated with monetary policy shocks. Indeed, in Section 5.2.1, we document that the refinancing of riskier loans increases more than that of safer loans after positive shocks to monetary policy rates. Due to the negative impact of refinancing on loan-fund performance, this will result in a negative correlation between loan-fund flows and monetary policy shocks, counteracting the direct, positive effect associated with increasing rates.

To control for the confounding effect of refinancing on loan-fund flows and identify the interest-rate channel of monetary policy, we exploit a fundamental asymmetry in the borrowers' incentive to refinance their loans as economic conditions and monetary policy evolve. In fact, the refinancing channel should only be at work when economic conditions improve, that is, when monetary policy shocks are positive; when economic conditions deteriorate, borrowers have no incentive to renegotiate their loans. As a result, we should expect the relation between monetary policy and loan-fund flows to be positive and stronger for negative monetary policy surprises.

[8]For instance, in 2017, a year characterized by improving macroeconomic conditions, about 70 percent of loan issuance by banks reflected refinancing and repricing of pre-existing loans (Morningstar, 2020).

Hypothesis 3: The interest-rate channel of monetary policy is dampened by borrowers' refinancing activity in good times, when policy shocks are positive. As a result, we expect the effect of the interest-rate channel on fund flows to be more important when monetary policy shocks are negative.

In principle, other unobserved factors that co-move with monetary policy could drive a wedge between the flows of loan and bond funds. To control for general forms of endogeneity and strengthen our identification of the interest rate channel, we exploit another institutional feature of leveraged loans that distinguishes them from bonds and other fixed-income securities. Namely, leveraged loan contracts have increasingly seen the introduction of rate floors. Under this feature, the loan rate is equal to the spread plus the greater between the reference rate and the floor, which protects the loan holders in periods of falling rates or prolonged low interest rates. The presence of a floor introduces a non-linearity in the interest rate channel, which we use for identification purposes.[9] Specifically, we expect the interest rate channel to be less important when benchmark rates such as LIBOR are below the loan rate floors, as it was the case during the ZLB period. This brings us to the last testable hypothesis:

Hypothesis 4: The positive effect of monetary policy shocks on loan-fund flows increases as short-term rates increase; that is, the interest-rate channel is stronger for higher levels of short-term rates.

[9] In contrast, for example, the presence of rate floors should not affect borrowers' incentives to refinance their loans.

3 Data Sources and Sample Characterization

The two main sources of data for this paper are Morningstar and the measures of monetary policy surprises developed by Swanson (2021). These data also determine our sample period, which goes from January 2010 through June 2019. We begin in January 2010 because Morningstar data on loan funds have low coverage before then, and we end in June 2019 because this is the last month for which the monetary policy measures were available.

3.1 Data on Mutual Funds

We rely on Morningstar to gather data on loan and corporate bond funds. In particular, for each share class, we obtain monthly data on the dollar value of net flows, total net assets, returns net of fees, and expense ratios.[10] At the fund level (i.e., portfolio level), we obtain information on gross returns, portfolio duration, and portfolio composition in terms of loans, bonds, stocks, and cash. To clean the data and control for possible incubation and termination effects, we drop observations for the first two months and final month of a share class's lifespan. As it is standard in the literature, to mitigate the effect of outliers, we trim flows and returns at the first and ninety-ninth percentiles of their distributions.[11]

Table 1 shows basic summary statistics for loan and bond funds from January 2010 to June 2019. Share classes in loan and bond funds are similar in terms of average size (TNA), but, consistent with the evidence in Figure 1, the former have experienced larger inflows during our sample period (despite having higher expense ratios). In terms of basic portfolio characteristic, loan funds and bond funds have similar gross returns

[10] A share class is a type of mutual fund share. A mutual fund can offer its investors different share classes; each class within the fund invests in the same portfolio of securities but has different shareholder services, distribution arrangements, fees, expenses, or minimum initial investment requirements.

[11] We trim flows and returns in each month and for each fund category separately to prevent our sample from being biased towards a specific fund category or time period.

and cash holdings. Consistent with their investment mandates, however, the average bond fund holds more corporate bonds (87% of its portfolio against 17% for the average loan fund), whereas the average loan fund holds more loans (73% against 2% for the average bond fund).[12]

Finally, loan funds have significantly shorter portfolio duration, as the rate of a leveraged loan typically resets every 30 to 90 days (see Morningstar, 2020); in contrast, corporate bond maturities typically range from one to 30 years.

3.2 Measuring Changes in Monetary Policy

Since we want to identify the causal effect of monetary policy on fund flows, it is important that we use unanticipated changes in monetary policy as explanatory variable. To measure monetary policy surprises, we use the three-factor decomposition of Swanson (2021). Since the great financial crisis (GFC), monetary policy has been implemented with multiple tools: through actual changes in the policy (federal funds) rate; through forward guidance, providing information regarding the future path of the policy rate; and through Large Scale Asset Purchase (LSAP) operations, aimed at achieving a broader effect on rates.

Using the high-frequency (30-minute) responses of asset prices to FOMC announcements, Swanson (2021) identifies the immediate causal effect of those announcements on financial markets. Namely, Swanson estimates a three-dimensional factor model, computing the first three principal components of the asset-price responses to FOMC announcements and imposing structural restrictions on these three factors to identify the different effects of each policy instrument.[13]

Since our data on fund flows are monthly, we convert Swanson's factors, which

[12]Bond funds also tend to hold slightly more equity than loan funds, but the difference is minimal as stock holdings are extremely small in both categories: 0.6% in bond funds and and 0.3% in loan funds.

[13]Rotations of a factor model are observationally equivalent. To separately identify changes in the federal funds rate from forward guidance, Swanson (2021) requires that changes in forward guidance have no effect on the current federal funds rate; to separately identify the effect of LSAP, he assumes that the LSAP factor is as close to zero as possible during the pre-ZLB period.

are measured around each FOMC announcement, to monthly frequency. Specifically, for each month, we define monetary policy surprises that are equal to the Swanson's factors if a FOMC meeting occurred during that month and equal to zero if there were no FOMC events (and therefore no surprises) in that month.

While monetary policy is executed with the three separate instruments, in this paper we want to focus on the factor that best captures surprises on the reference rates of leveraged loans. Since leveraged loans are usually priced off the 3-month Libor, the best candidate for this purpose is the forward guidance factor. Although the fed funds factor could also capture surprises in reference rates, fed funds rates did not move for many years after the GFC; moreover, their changes have been often anticipated by market participants. As pointed out by Swanson (2021), "Throughout the 2009–15 ZLB period, the funds rate was close to zero and barely changed, even in response to FOMC announcements;" and even more interestingly, "the federal funds rate factor remains very small even after 2015, as the FOMC raised rates gradually and very predictably."[14].

In contrast, not only is the forward guidance factor supposed to capture surprises on the future path of the reference rates by construction ("... forward guidance is defined to be the component of FOMC announcements that conveys information about the future path of short-term interest rates above and beyond changes in the target federal funds rate itself." Swanson, 2021, p. 37), but it also displays significant variation during 2010-2019 and aligns well with the main events registered over time (see Figure 1 in Swanson (2021), pg. 40). Both these features are key for our identification purposes. As a result, since reference rates are what matter for loan-contract resets, forward-guidance surprises should have a material and direct impact on investors' expectations about the future income stream of loan funds.

Finally, by their own nature, LSAPs are intended to affect long term rates. They are implemented with purchases of long term treasuries and MBSs. LSAPs are not meant

[14]See Swanson (2021), p. 41.

to affect the short end of the yield curve. Hence, the LSAP factor - by construction - is not intended to capture changes in the reference rates and should therefore have a small effect on investors' expectations regarding loan resets.

For these reasons, in our empirical analysis of loan- and bond-fund flows, we focus on the impact of forward-guidance (FG) surprises; as we show in our robustness checks, however, our results are robust to controlling for the concomitant effects of the other two factors.

4 The Flow-Performance Relationship in Loan Funds

In this section, we test Hypothesis 1, i.e., that the flow-performance relationship of loan funds is concave and more so than that of bond funds. If correct, this hypothesis would suggests that loan funds are exposed to run risk and more so than bond funds.

To test Hypothesis 1, similar to the analysis of the flow-performance relation of bond funds in Goldstein *et al.* (2017), we estimate the following regression at the share-class level and monthly frequency:[15]

$$\begin{aligned}\text{Flow}_{it} = {} & \beta_0\,\text{Return}_{it-1} + \gamma_0\,\mathbf{1}\,(\text{Return}_{it-1} < 0) + \delta_0\,\mathbf{1}\,(\text{Return}_{it-1} < 0) \times \text{Return}_{it-1} + \\ & + \beta_1\,\text{Loan}_{it-1} \times \text{Return}_{it-1} + \gamma_1\,\text{Loan}_{it-1} \times \mathbf{1}\,(\text{Return}_{it-1} < 0) + \\ & + \delta_1\,\text{Loan}_{it-1} \times \mathbf{1}\,(\text{Return}_{it-1} < 0) \times \text{Return}_{it-1} + \\ & + \theta\,\text{Flow}_{it-1} + \phi\,\text{Controls}_{it-1} + \alpha_i + \mu_t + \varepsilon_{it}, \qquad (1)\end{aligned}$$

where Flow_{it} is the net flow of class i in month t, defined as $(\text{TNA}_{it} - \text{Return}_{it} \times \text{TNA}_{it-1})/\text{TNA}_{it-1}$, and Return_{it} is class i's annualized net return in month t, a proxy for its performance. $\mathbf{1}\,(\text{Return} < 0)$ is a dummy variable for negative returns, and Loan is a dummy variable for share classes belonging to loan funds.[16] Controls is a vector of

[15] While Goldstein *et al.* (2017) are concerned with estimating the flow-performance relation of bond funds, our focus is on loan funds and their comparison with bond funds.

[16] The variable Loan is time varying because, in our sample, a few share classes (20 out of 6,055) switched from being

controls including the loan-fund dummy, the logarithm of the class TNA, and the class expense ratio. We also include lagged flows as regressor to control for serial correlation. α_i are share-class fixed effects to control for unobserved cross-sectional heterogeneity, and μ_t are time fixed effects to control for unobserved time-varying common factors.

Regression (1) allows for the flow-performance relation to have different slopes in the regions of positive and negative returns, separately for bond and loan funds. When returns are positive, the slope is β_0 for bond funds and $\beta_0 + \beta_1$ for loan funds; when returns are negative, the slope is $\beta_0 + \delta_0$ for bond funds and $(\beta_0 + \beta_1) + (\delta_0 + \delta_1)$ for loan funds.[17] The flow-performance relation of bond funds is concave if δ_0 is positive, in which case investor flows are more sensitive to bad performance than good ones. The flow-performance of loan funds is more concave than that of bond funds if δ_1 is positive, in which case the slope differential between the regions of negative and positive returns is greater for loan funds than for bond ones.

Regression (1) is estimated on a pooled sample of bond and loan funds from January 2010 to June 2019. In principle, loan-fund flows could be more sensitive to fund performance because of the higher credit risk of leveraged loans relative to corporate bonds. To control for credit risk, in our baseline specification, we estimate regression (1) including only high-yield bond funds as the control group; high-yield bond funds invest in bonds that have a credit-risk profile similar to that of the leveraged loans held by loan funds (Banegas and Goldenring, 2019). For robustness, however, we re-estimate regression (1) using all corporate bond funds as control group. All results are reported in Table 2. Standard errors are clustered at the share-class level to control for serial correlation.

We start by estimating a simplified version of equation (1) that only includes linear return terms; that is, we drop the terms proportional to $\mathbf{1}(\text{Return} < 0)$ from

part of a loan fund to being part of a bond fund or vice versa.

[17]Regression (1) also allows for the flow-performance relations of the two fund groups to have different jumps at zero: γ_0 for bond funds and $\gamma_0 + \gamma_1$ for loan funds.

equation (1). This regression measures the unconditional (i.e., across both positive and negative returns) average slope of the flow-performance relation for bond and loan funds. The results of this specification are reported in Column (1) and confirm that investor flows positively respond to fund performance, as widely documented in the mutual fund literature.[18]

Namely, for high-yield bond funds, a one-standard-deviation increase in net returns leads to a statistically significant increase in monthly flows by 0.4 percentage points (pp) with p-value $= 0.049$.[19] The effect for loan funds is even stronger: their monthly flows increase by additional 1.5 pp (p-value < 0.01). This effect is also economically significant, as it represents more than 10% of the standard deviation of monthly flows in our sample.[20]

In Column (2), we re-estimate the same regression using all corporate bond funds as control group. Results are largely similar: a one-standard-deviation increase in net returns leads to a statistically significant increase in the monthly flows of bond funds by 0.4 pp (p-value < 0.01) and additional inflows in loan funds by 1.1 pp (p-value < 0.01).

We now turn to quantifying the differential response of loan-fund flows to bad performance and to testing our Hypothesis 1. Columns (3) and (4) of Table 2 show the results of regression (1) when the control group is high-yield and all corporate bond funds, respectively. First, consistent with Goldstein *et al.* (2017), we see that bond funds exhibit a concave flow-performance relationship: the sensitivity of their outflows to bad performance is greater than that of their inflows to good performance. While the result is not significant for high-yield bond funds, possibly because of the smaller sample size, it is both statistically significant and economically important for the whole category of corporate bond funds ($\delta_0 = 0.036$, with p-value < 0.01); in particular, the slope of their

[18]See Ippolito (1992), Chevalier and Ellison (1997), and Sirri and Tufano (1998) for equity mutual funds; Christoffersen and Musto (2002), Kacperczyk and Schnabl (2013), and La Spada (2018) for money market funds.

[19]The in-sample standard deviation of annualized net returns across all fund categories is 16 pp.

[20]The in-sample standard deviation of monthly flows is 14 pp.

flow-performance relation for negative returns is more than four times larger than that for positive returns.

Second, and more importantly, the flow-performance relation of loan funds is concave and even more so than that of bond funds, as shown by the positive estimates for δ_1. This is true both when comparing loan funds only to high-yield bond funds ($\delta_1 = 0.099$, p-value < 0.01) and when including all corporate bond funds in the control group ($\delta_1 = 0.087$, with p-value $= 0.016$). For example, the slope differential between the negative- and positive-return regions for loan funds is more than three times as large as for all corporate bond funds, whose flow-performance relation is already significantly concave ($\delta_0 + \delta_1 = 0.123$ versus $\delta_0 = 0.036$). Whereas an increase in positive returns does not lead to any additional inflows into loan funds relative to bond funds, a one-standard-deviation drop in negative returns leads to additional monthly outflows of 1.6 pp relative to high-yield funds and of 1.4 pp relative to all corporate bond funds.

These results corroborate our Hypothesis 1, indicating that loan funds exhibit greater flow sensitivity to performance and are more exposed to run risk when they experience a deterioration in their returns.

5 Monetary Policy and Loan-Fund Flows

The results of Section 4 show that loan funds are more exposed to run risk than bond funds. The higher illiquidity of their assets gives their investors a stronger first-mover advantage, thereby amplifying outflows following bad news on fund performance.

On close inspection, we see that not only are loan funds more exposed to run risk than bond funds at the individual fund level, but their aggregate flows are also much more volatile over time. Panel (a) of Figure 2 compares the monthly net flows of the loan-fund industry to those of the bond-fund industry: fluctuations in the loan-fund industry are significantly greater throughout our sample. In principle, the higher flow volatility of the loan-fund industry could be explained by a higher return volatility. However, this does not seem to be the case: as shown by panel (b) of Figure 2, fluctuations in the average realized returns of loan and bond funds are remarkably similar in magnitude; if anything, the average return of the loan-fund industry seems to be slightly less volatile.

This evidence suggests the presence of a common factor affecting loan-fund flows more than bond-fund ones, beyond the effect of past realized returns. As we discussed in Section 2, the unique floating-rate nature of leveraged loans suggests that monetary policy shocks can affect investors' expectation on the future performance of loan funds, acting as a coordination device that can trigger flow volatility in the whole sector. In this section, we test our hypotheses on the effect of monetary policy on loan funds' flows through the interest-rate channel.

5.1 The Average Effect of Monetary Policy Shocks

Our Hypothesis 2 suggests that monetary policy shocks have a positive impact on loan-fund flows through an interest-rate channel. In testing this hypothesis, to control for the general effect of monetary policy on debt markets, we use bond funds as a control group. In particular, since leveraged loans are on average riskier than corporate bonds, we use bond funds that invest mainly in high-yield securities as baseline control group. For robustness, in appendix, we show the results of our regressions when using all corporate bond funds as control group; results are similar.

To test Hypothesis 2, we estimate the following monthly regression at the share-class level:

$$\text{Flow}_{it} = \beta\,\text{Loan}_{it-1} \times \text{FG Surprise}_t + \theta\,\text{Flow}_{it-1} + \phi\,\text{Controls}_{it-1} + \alpha_i + \mu_t + \varepsilon_{it}\,, \tag{2}$$

where FG Surprise is the Swanson's forward-guidance surprise and the other variables are defined as in equation (1). In equation (2), Controls also include the share-class lagged return and its interaction with the loan-fund dummy, to control for the effect of past performance and allow for differential effects across loan and bond funds (as documented in the previous section). α_i and μ_t are share-class and time fixed effects. Standard errors are clustered at the share-class level to control for serial correlation.

The coefficient of interest is β, which represents the additional sensitivity of loan-fund flows to monetary policy shocks, relative to flows in high-yield bond funds. We report the results of regression (2) in Column (1) of Table 3.

The results show that loan-fund investors are significantly more sensitive to monetary policy shocks than bond-fund investors ($\beta = 0.996$ with p-value < 0.01). This evidence implies a stronger commonality in the flow dynamics of loan funds, due to their response to monetary policy surprises. The economic magnitude of this estimate is also significant: for a one-standard-deviation increase in the forward-guidance surprise, loan-fund monthly flows increase by additional 0.6 pp relative to those of bond funds.

Section 4 shows that loan-fund flows are more sensitive to bad past performance than to good one, and more so than those of bond funds. If Swanson's monetary policy surprises were somehow correlated with past fund performance, and such correlation differed for negative and positive performance, there would be an endogeneity issue in the form of an omitted-variable bias. For robustness, we re-estimate regression 2 controlling for the full non-linear flow-performance relation estimated in Section 4; that is, not only do we allow loan-fund and bond-fund flows to have different sensitivities to past fund performance, but we also allow these sensitivities to be different for positive and negative returns. Results are in Column (2) and are practically identical.

Monetary policy can affect the market's risk aversion and expected volatility (Bekaert et al., 2013; Bruno and Shin, 2015). Since loan funds tend to hold riskier assets than bond funds, monetary policy may affect their relative flows through its effects on investors' risk aversion and uncertainty. To control for this confounding factor, in addition to using high-yield bond funds as control group, we re-estimate regression

(2) including the interaction of the VIX with the loan-fund dummy as control. Such interaction should absorb the additional effect of changes in risk aversion and uncertainty on investor flows in loan funds, relative to high-yield bond funds.

Results are in Columns (3) and (4) and are consistent with those in Columns (1) and (2): FG surprises have a significantly positive effect on loan-fund flows, and this effect is also remarkably stable quantitatively. For example, in Column (3), a one-standard-deviation increase in the FG factor leads to additional inflows in loan funds by 0.6 pp (p-value < 0.01), exactly as in Column (1). Finally, consistent with our expectations, an increase in VIX does lead to additional outflows from loan funds relative to high-yield bond funds; this result confirms that loan funds are more sensitive to changes in the market's risk aversion and uncertainty, probably because leveraged loans are riskier than bonds, even high-yield ones.

Table 11 in appendix replicates the results of Table 2 using all corporate bond funds as control group. Results are similar: a one-standard deviation increase in the FG surprise leads to additional monthly inflows in loan funds between 0.5 and 0.7 pp (p-value < 0.01), relative to all corporate bond funds. These results are robust to different specifications of the flow-performance relation and to the inclusion of the interaction of the loan-fund dummy with the VIX.

5.1.1 Robustness Tests

We run several robustness checks. First, we repeat our exercise controlling for the other two types of monetary policy surprises developed by Swanson (2021): the fed funds rate (FFR) and LSAP factors. Namely, we re-estimate regression (2) including the interactions of the loan-fund dummy with the FFR and LSAP surprises as additional controls.[21] Results are in Table 4.

The additional sensitivity of loan-fund flows to changes in forward guidance re-

[21] Since Swanson's LSAP factor has the opposite sign of the other monetary policy surprises (i.e., a positive LSAP factor corresponds to monetary policy easing), in our regressions, we take its negative value.

mains similar in magnitude and statistically significant: $\beta = 0.717$ (p-value < 0.01) when controlling for a linear flow-performance relationship, and $\beta = 0.711$ (p-value < 0.01) when controlling for the more general, non-linear one. These result are also robust to controlling for the interaction of the VIX with the loan-fund dummy (Columns (3) and (4)).

Moreover, the effect of LSAP surprises is also positive and significant, broadly consistent with our conjecture of the monetary policy on loan-fund flows. The effect of fed funds surprises, in contrast, is statistically insignificant across all specifications, which is probably due to precious little variation of the fed funds factor in our sample.

Second, could the differential effect of monetary policy on loan-fund and bond-fund flows be driven not by the institutional characteristics of loan-fund holdings, but rather by those of bond-fund holdings? Shocks to monetary policy rates can also affect the performance, and therefore the flows, of bond funds, as they affect bond valuation: as interest rates rise, bond prices fall, potentially hurting bond-fund returns. We attempt to rule out this alternative explanation with several checks.

In the first test, we estimate regression (2) without time fixed effects, so as to measure the effect of monetary policy on the flows of both loan and high-yield funds. In principle, the estimated increase in the flow differential between loan and bond funds due to positive monetary policy shocks could be driven by bond-fund outflows rather than loan-fund inflows. If this were the case, we should observe a negative and large coefficient on FG surprises for high-yield bond funds.

Our results, reported in Table 5, show the opposite: FG surprises have a small and significantly positive effect on the flows of high-yield funds (0.163 pp with p-value $=$ 0.018). Consistent with our baseline results, the additional effect of monetary policy shocks on loan-fund flows is large, significant, and remarkably stable (β =1.049 with p-value < 0.01). These results are robust to controlling for a nonlinear flow-performance relation (Column (2)) and to including the interaction of the VIX with the loan-fund dummy (Columns (3) and (4)). Table 13 in the appendix replicates Table 5 using all corporate bond funds as control group.

A possible issue with this robustness check, of course, is that, by dropping month fixed effects from regression (2), we cannot exclude that these results are affected by concomitant omitted factors correlated with monetary policy shocks. To address this concern, we re-estimate regression (2) controlling for the duration of a fund's portfolio and its interaction with the FG surprise. The exposure of a fixed-income security, such as a bond, to interest rate risk can be proxied by its duration; as a result, the performance of a fund with higher portfolio duration should exhibit a stronger (negative) relationship with monetary policy shocks. To control for endogeneity issues, we lag portfolio duration by one month.

The results of this test are reported in Table 6 and are very close to our baseline ones: a one-standard-deviation increase in the forward guidance surprise leads loan-fund monthly flows to increase by 0.5 pp (with p-value < 0.01) relative to those of high-yield bond funds. In Column (2), we control for the full nonlinear flow-performance relation of regression 1; in Columns (3) and (4), we replicate Columns (1) and (2) adding the interaction of the VIX with the loan-fund dummy as control. The differential effect of monetary policy shocks on loan-fund flows remains statistically significant (p-value $=$ 0.032 in Column (3) and p-value $= 0.036$ in Column (4)) and quantitatively similar.

Table 14 in the appendix replicates Table 6 using all corporate bond funds as control group; results are very similar.

This evidence provides strong support to our Hypothesis 2: monetary policy shocks have a positive effect on loan-funds flows, corroborating the existence of a significant interest-rate channel of monetary policy.

5.2 Positive and Negative Monetary Policy Surprises

5.2.1 Monetary policy and corporate loan refinancing

As we noted in Section (2), a distinctive feature of leveraged loans is their exposure to borrowers' refinancing decisions. Borrowers, especially riskier ones, have strong incentives to refinance their loans during economic booms. The improvement in borrowers' financial conditions that typically occurs during expansionary periods makes it easier for the borrowers to refinance their outstanding loans with new ones that have better terms, such as lower spreads or longer maturities.

As a result, in times of positive monetary policy surprises - typically occurring during economic expansions - we should be observing relatively more refinancing activity among the riskier borrowers. To investigate our assertion, we estimate the following model on loan data from Dealscan at quarterly frequency:

$$\begin{aligned}\text{Refi}_{it} = &\beta\,\text{FG Surprise}_{t-1} + \gamma\,\text{LoanSpread}_i \\ &+ \theta\,\text{FG Surprise}_{t-1} \times \text{LoanSpread}_i + \phi\,\text{Controls}_{it} + \psi_{b(i)} + \varepsilon_{it} \qquad (3)\end{aligned}$$

where Refi_{it} is a dummy variable equal to one if loan i is refinanced in quarter t and zero otherwise.

Dealscan does not identify which loans are refinanced and when they are refinanced; it only contains information on the loan terms at origination.[22] To identify refinancings, we follow each borrower over time and classify a loan as being refinanced if the borrower takes out a subsequent loan of the same type (term loan or credit line) from the same lead bank before the prior loan reaches its maturity date. When that happens, we assume the borrower refinanced the prior loan with the new loan.

LoanSpread_i is the all-in-drawn spread on the loan. According to DealScan, the

[22] Dealscan contains a variable that indicates whether a given loan is to refinance existing debt, but it does not identify the loan being refinanced.

all-in-drawn spread is a measure of the overall cost of the loan, expressed as a spread over LIBOR, because it takes into account both one-time and recurring fees associated with the loan. We use the loan spread to proxy for borrower risk, as it is well established that riskier borrowers pay higher spreads on their loans. Further, this gives us the opportunity to consider both loans from publicly listed borrowers as well as loans from privately held firms, which we would have to drop had we decided to rely on either accounting or stock-market based measures of firm risk.

FG Surprise$_{t-1}$ is a dummy variable equal to one if the sum of Swanson's FG surprises in the previous quarte was positive. The variable of interest in our model is the interaction between the loan spread and the forward guidance factor: it tests whether riskier borrowers, whose loans are prevalent in loan funds, are more likely to refinance during periods of favourable economic conditions as captured by positive monetary policy surprises.

We estimate our refinancing model with a pooled regression and with borrower fixed effects ($\psi_{b(i)}$) to focus on within-borrower identification. We also consider a specification that, in addition to borrower fixed effect, also includes year dummies to account for macro effects at the yearly level. Finally, in all models, we include a set of loan-specific controls (Controls$_{it}$) to account for the size of loan, whether the loan is in its last year prior to reaching maturity, whether the loan had an interest rate floor, and the purpose of the loan (corporate purposes, working capital, M&A financing, CP backup).

Our sample runs from 2010:Q1 until 2019:Q2, covering a total of 883,336 loan-quarter observations. We identify 27,545 loan-quarter observations as instances of refinancing.[23]

The results of our regression 3 are reported in Table 7. As we conjectured, following positive surprises in forward guidance, riskier borrowers are relatively more

[23] Ideally, one would run this exercise on the set of borrowers whose loans are held by the loan funds in our sample. Unfortunately, we are unable to do so because we do not have security-level information on fund portfolios. However, since loan funds mainly invest in leveraged loans, there is likely a meaningful overlap between their borrowers and the riskier borrowers in our Dealscan sample.

likely to refinance their loans. Note that the coefficient on FG $\text{Surprise}_{t-1} \times \text{LoanSpread}_i$ is positive and statistically significant across the three specifications of Table 7.

For robustness, we rerun regression 3 restricting our classification of refinancing to those loans whose spreads are lower than those of the original loans.[24] We continue to find that riskier borrowers are relatively more likely to refinance their loans following positive forward guidance surprises. Since loan funds invest mostly in term loans. but our sample includes both term loans and credit lines, we also re-estimate regression 3 including only term loans. Results are similar.

This evidence supports the presence of refinancing activity in the leveraged-loan market that is positively correlated with forward guidance surprises and can dampen the interest-rate channel of monetary policy on loan-fund flows.

5.2.2 The dampening effect of refinancing on loan-fund flows

Our Hypothesis 3 suggests that, when monetary policy surprises are positive, the refinancing activity of risky borrowers dampens the effect of the interest-rate channel of monetary policy on loan-fund flows. The improvement in loan terms associated with refinancing has the potential to adversely affect the income stream of loan funds, and therefore their inflows. In contrast, such confounding factor (i.e., the co-movement of monetary policy with economic conditions in debt markets) does not affect flows in high-yield bond funds because, as opposed to leveraged loans, bonds cannot be refinanced.

The effect of borrowers' refinancing on loan-fund flows, however, is asymmetric by construction: borrowers have no incentive to refinance their loans when economic conditions deteriorate, which typically correlates with negative policy surprises. This asymmetry suggests that we can identify the effect of the interest-rate channel of monetary policy on loan-fund flows by looking at negative policy surprises.

Figure 3 compares the cumulative flows in loan funds and high-yield bond funds

[24]Note that borrowers sometimes refinance their loans for reasons other than lowering their interest rates (e.g., to increase the maturity of their existing loans). See Mian and Santos (2018).

in two different periods: a period when Swanson's FG surprises were mainly positive (January-September 2012) and a period when they were mainly negative (September 2018-June 2019). The figure shows that, when FG surprises were mainly positive, the cumulative flows of loan and bond funds moved upward together, without a clear differential pattern, both reaching roughly 10% at the end of the period. In contrast, when surprises were mainly negative, flows in loan funds dropped significantly (reaching a cumulative outflows of almost 20% in June 2019), whereas those of high-yield bond funds remained roughly stable throughout the same period.

To test Hypothesis 3 formally, we run regression 2 splitting FG surprises in positive and negative ones. By doing so, we estimate separate coefficients for the interaction of the loan-fund dummy with positive and negative monetary policy shocks. Results are in Table 8 and confirm Hypothesis 3 and the visual evidence in Figure 3.

Positive surprises have no significant differential effect on loan-fund flows; if anything, their estimated effect is mildly negative ($\beta = -0.453$ with p-value $= 0.404$), which is consistent with the presence of a confounding factor (borrowers' refinancing activity) that goes in the opposite direction of the interest-rate channel we aim to identify. In contrast, the effect of negative surprises is strong and significant: a one-standard deviation drop in Swanson's FG surprise leads to additional monthly outflows of 1.1 pp (p-value < 0.01) from loan funds relative to high-yield bond funds.

We observe similar results, in terms of both statistical significance and economic magnitude, when we control for a non-linear flow-performance relationship (Column (2)) and when we include the interaction of the VIX with the loan-fund dummy (Columns (3) and (4)). Finally, for robustness, Table 15 in the appendix replicates Table 8 using all corporate bond funds as control group; results are almost identical.

5.3 Rate Floors and the Interest-Rate Channel

In this section, we test Hypothesis 4. Namely, we exploit the institutional feature of rate floors that was introduced in the late 2000s, when rates were in a rapid downward trend, to identify the presence of the interest rate-channel linking monetary policy and loan-fund flows. For loan-fund flows, it is not only the monetary policy shock itself that matters, but also the *level* of interest rates at the time of the surprise.

To that end, we run regression (2) splitting the time series in two periods: one in which interest rates were presumably below loan-rate floors, and one in which rates were arguably above rate floors. Table 9 presents the results. Our conjecture is that the effect of forward guidance on the flow differential between loan funds and bond funds should be stronger in the second period; the reason is that in the first period, when the benchmark rate is below the floor, loan rates do not change.

Since each loan can have a different rate floor, and we do not have such security-level information in our data (nor we have information on the average rate floor at the fund-portfolio level), we have to use a different approach to identify the two periods. To that end, we split our sample period in two periods depending on whether the LIBOR–the most common reference rate for leveraged loans–was below or above 1.5 percent; 1.5 percent roughly represents the average floor rate on leveraged loans issued over our sample period (DDJ Capital Management, 2015).

Consistent with our hypothesis, the positive effect of a monetary policy surprise on loan-fund flows when the LIBOR is below 1.5% is materially smaller than the same effect when the LIBOR is above 1.5%. Relative to its effect on high-yield bond funds, a one-standard-deviation increase in the FG surprise leads to additional monthly inflows in loan funds of 0.5 pp (p-value < 0.01) when LIBOR is below 1.5% and of 1.3 pp (p-value < 0.01) when LIBOR is above 1.5%. The difference between these estimates is statistically significant at the 1% level.[25]

[25]To test that the difference between the two estimates is statistically significant, we estimate regression (2) on the full

These findings are confirmed when we control for a non-linear flow-performance relation (Columns (3) and (4)), and when we add the interaction of the VIX with the loan-fund dummy (Columns (5)–(8)). Moreover, Table 16 replicates Table 9 using all corporate bond funds as control group, obtaining similar results.

Our findings are confirmed when we split our sample period depending on whether interest rates were at the zero-lower bound (ZLB)–i.e., below any floor rate–or not. The ZLB period is defined as January 2010-December 2015. The results of this exercise are reported in Table 10. Again, the positive effect of a monetary policy shock increases as rates move away from the ZLB. For example, relative to the flows in high-yield funds, the additional impact of a one-standard-deviation increase in the FG factor on monthly loan-fund flows goes from 0.3 pp (p-value < 0.01) during the ZLB to 0.8 pp (p-value < 0.01) after the ZLB. The difference between the two estimates is significant at the 1% level. We obtain similar results when controlling for a non-linear flow-performance relation (Columns (3) and (4)).

In sum, consistent with our hypotheses, we find evidence that loan funds are more sensitive to monetary policy shocks than bond funds, suggesting a heightened aggregate volatility of investor flows in and out of these funds. Moreover, we also find evidence of a non-linearity in the effect of monetary policy on loan-fund flows, which adds insights on the role of institutional features in shaping monetary policy transmission.

6 Final Remarks

Over the last couple of decades, we have observed the growth of a garden variety of investment vehicles that engage in significant liquidity transformation. In this space, open-end funds have certainly played a dominant role. These instruments provide access to liquidity on demand while offering significantly higher rates of return than bank

sample adding the interactions of all right-hand side variables with a dummy for the period when LIBOR is above 1.5%.

deposits.

Among all types of open-end funds, bank-loan funds have experienced, by far, the fastest growth over the past decade. And by mainly holding leveraged loans, these funds are the closest approximation to the balance sheet of a "textbook bank" in the non-bank financial intermediation sector. In contrast to banks, however, they have neither FDIC insurance nor the same level of regulatory and supervisory oversight.

We conjecture that, as any vehicle generating liquidity transformation, loan funds are exposed to run risk and, since their holdings are more illiquid and opaque than bonds, more so than corporate bond funds, whose runnability has been widely documented. Our empirical analysis confirms this hypothesis. Investor flows in loan funds display a higher sensitivity to past performance than those in bond funds, including high-yield ones. In particular, the flow-performance relationship of loan funds exhibit a much stronger concavity, suggesting a greater acceleration of outflows following bad news and consistent with their greater exposure to run risk.

Even more importantly, we establish a link between loan funds' flows and monetary policy, based on the institutional characteristics of their portfolio holdings. Since the rates of leveraged loans reset at high frequency based on an underlying reference rate (typically LIBOR), changes in short-term interest rates are likely to be an important – common – determinant of investors' expectations on loan-fund performance. This observation suggests a key role for monetary policy in driving loan funds' aggregate flows and their volatility. Our evidence corroborate this hypothesis as well: loan-fund investors positively respond to monetary policy shocks.

Likewise, because of the leveraged loans' refinancing and rate floors features, we conjectured, and provided corroborating evidence, indicating that the procyclical relationship between monetary policy and loan-fund flows, however, is asymmetric: it is weaker for policy-rate increases and stronger for policy-rate decreases. And finally, it is also non-linear in the level of the interest rates, suggesting that it is not only the direction of change in monetary policy that matters, but also the level of the policy rate at the time of the change.

Our results identify a *novel channel of monetary policy transmission* that affects the critical segment of the credit sector represented by leveraged lending. Not only does our paper contribute to the traditional literature on monetary policy transmission, but it is also particularly relevant for the more recent – and less explored – research studying the impact of monetary policy on credit activity and financial stability in markets dominated by non-bank financial intermediaries.

By identifying how monetary policy affects the leveraged-lending market through loan-fund flows, the study emphasizes the key role played by institutional characteristics in shaping such effect. In our analysis, the open-end feature of loan funds is important, but so are features of leveraged loans such as rate floors and renegotiation optionality. As institutional features change across markets, participants, and time, our results highlight the increasingly challenging nature of monetary policy conduct, and the need for an adaptable framework, especially in systems where both bank and non-bank financial institutions co-exist.

Figures

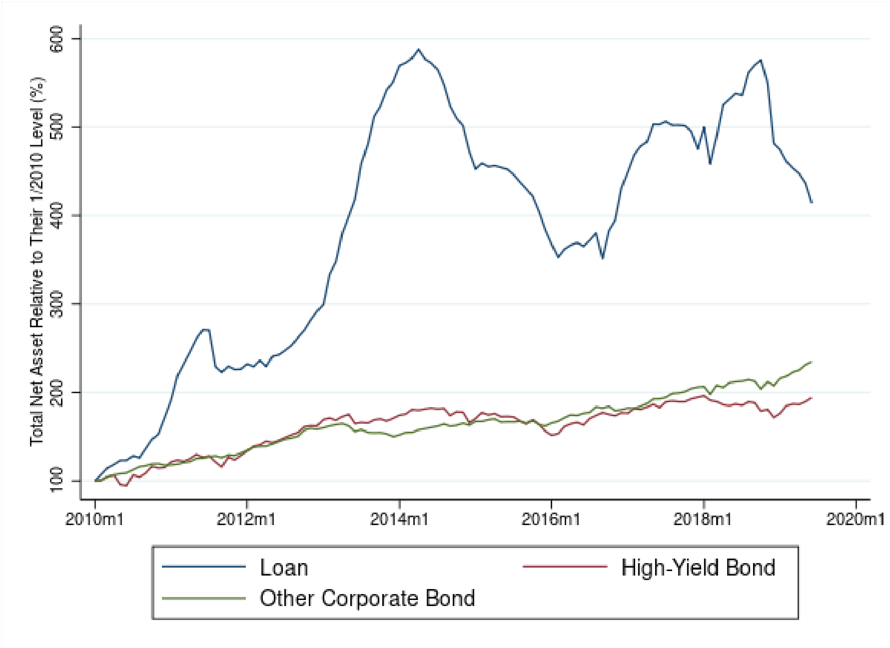
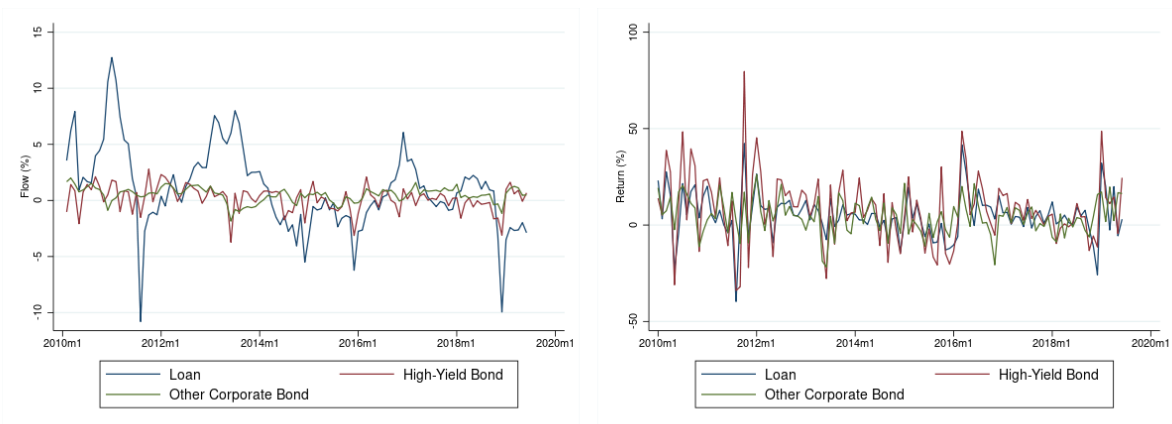


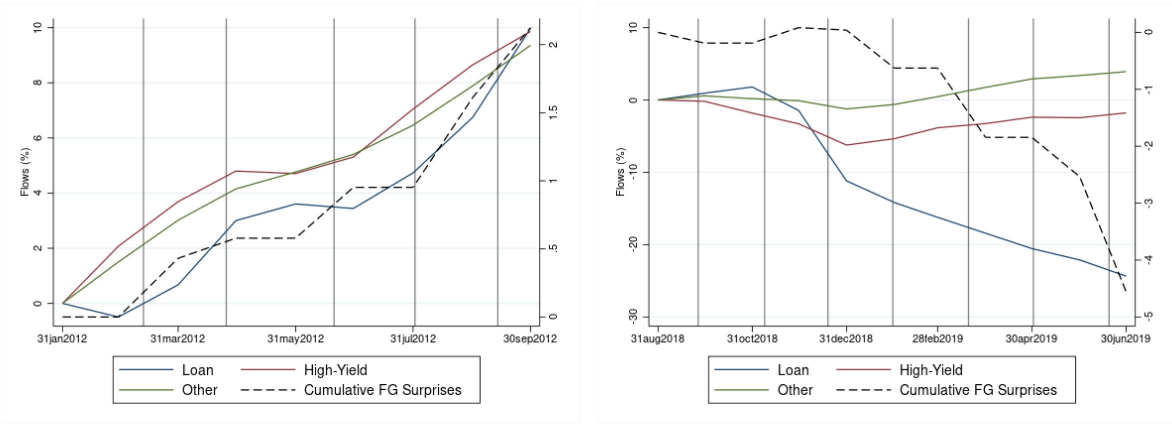
Figure 1: Loan-Fund and Bond-Fund Industry Growth. This figure displays the growth in the monthly total net assets (TNA) of loan funds and corporate bond funds, separately. The series are normalized by each industry's TNA in January 2010; the initial value is set to 100.



(a) Industry Aggregate Net Flows

(b) Industry Average Net Returns

Figure 2: Aggregate Flows and Average Returns in Loan and Bond Funds. Panel (a) displays aggregate monthly net flows as a percentage of the industry total net assets (TNA) in the previous month for loan funds, high-yield bond funds, and other corporate bond funds. Panel (b) displays the weighted average monthly net return of loan funds, high-yield bond funds, and other corporate bond funds; the average is weighted using share-class TNA as weights; returns are annualized.



(a) February-September 2012 **(b)** September 2018-June 2019

Figure 3: Cumulative Flows and Positive and Negative Forward guidance Surprises. Panel (a) shows the cumulative flows in loan funds, high-yield bond funds, and other corporate bond funds from February to September 2012, as a percentage of each industry's total net assets (TNA) at the end of January 2012. Panel (b) shows the cumulative flows in loan funds, high-yield bond funds, and other corporate bond funds from September 2018 to June 2019, as a percentage of each industry's TNA at the end of August 2018. The dashed lines represent the cumulative sums of forward guidance (FG) surprises from Swanson (2021) over the same periods (right y-axis).

Tables

	Loan	Corporate Bond	Corporate-Loan
Share-class, Month Level Statistics			
TNA (Millions USD)	515.24	676.64	161.41
	(1106.90)	(3555.81)	(1.32)
Flow (Percent)	3.26	1.20	-2.06***
	(40.35)	(13.53)	(-4.18)
Expense ratio (Percent)	1.14	0.95	-1.92***
	(0.45)	(0.48)	(-7.22)
Observations	20889	356291	
Unique Share-classes	285	5340	
Fund, Month Level Statistics			
Gross Return (Percent)	5.90	5.95	0.05
	(11.74)	(16.36)	(0.297)
Duration (Years)	0.42	4.14	3.72***
	(0.38)	(2.01)	(51.56)
Loan (Percent)	72.70	1.53	-71.17***
	(23.80)	(5.06)	(-57.03)
Bond (Percent)	17.45	87.27	69.83***
	(21.84)	(17.60)	(58.38)
Equity (Percent)	0.33	0.57	0.23**
	(0.86)	(2.41)	(2.41)
Cash (Percent)	6.28	5.75	-0.53
	(5.94)	(111.25)	(-0.85)
Observations	5198	107688	
Unique Funds	69	1467	

Table 1: Summary statistics of loan and bond funds at the share-class and fund level. The sample is from January 2010 to June 2019. Data are monthly. TNA is total net assets in millions of USD. Flow is the net flow of the share class in percent, relative to the prior month's TNA. Expense ratio is the monthly net expense ratio in percent. Gross return is the monthly annualized return of the fund's portfolio in percent. Duration is the average duration of the fund's portfolio in years. Loan, Bond, Equity, and Cash are the percent of the fund's portfolio held in the respective asset category each month. Standard deviations are in parentheses. The third column shows the difference in means between the two group of funds; t-statistics using standard errors clustered at the fund level are in parentheses. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$			
	(1)	(2)	(3)	(4)
Return$_{it-1}$	0.024**	0.024***	0.019***	0.011***
	(0.012)	(0.003)	(0.007)	(0.004)
Loan$_{it-1}$ × Return$_{it-1}$	0.092***	0.070***	0.010	-0.010
	(0.010)	(0.011)	(0.027)	(0.029)
I(Return < 0)$_{it-1}$			-0.332	-0.076
			(0.319)	(0.093)
Loan$_{it-1}$ × I(Return < 0)$_{it-1}$			-1.830***	-1.924***
			(0.481)	(0.517)
I(Return < 0)$_{it-1}$ × Return$_{it-1}$			0.002	0.036***
			(0.022)	(0.009)
Loan$_{it-1}$ × I(Return < 0)$_{it-1}$ × Return$_{it-1}$			0.099***	0.087**
			(0.038)	(0.036)
Flow$_{it-1}$	0.041*	0.066***	0.041*	0.065***
	(0.024)	(0.019)	(0.023)	(0.019)
Loan funds: β (Return$_{it-1}$)	0.116***	0.094***		
(F-statistic)	(67.17)	(83.56)		
Loan funds: β (Return$_{it-1} > 0$)			0.029	0.001
(F-statistic)			(1.25)	(0.00)
Loan funds: β (Return$_{it-1} < 0$)			0.129***	0.124***
(F-statistic)			(17.67)	(61.29)
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Controls$_{i,t-1}$	Y	Y	Y	Y
Bond-fund Control Group	High Yield	All Corporate	High Yield	All Corporate
Adjusted R^2	0.063	0.061	0.064	0.061
Observations	111311	351058	111311	351058

Table 2: Flow-performance relationship in loan and bond funds. Regressions are estimated on a pooled sample of loan (treatment) and bond (control) funds. The sample is from January 2010 to June 2019. The unit of observation is share class-month. In Columns (1) and (3), the control group is high-yield bond funds; in Columns (2) and (4) the control group is all corporate bond funds. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Return is the annualized net return in percent. Loan is a dummy variable equal to one for loan-fund share classes. I(Return < 0) is a dummy variable equal to one if the net return is negative. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	$Flow_{it}$			
	(1)	(2)	(3)	(4)
$Loan_{it-1}$ × FG $Factor_t$	0.996***	0.914***	0.910***	0.865***
	(0.136)	(0.132)	(0.138)	(0.134)
$Loan_{it-1}$ × VIX_t			-0.109***	-0.066*
			(0.028)	(0.034)
$Flow_{it-1}$	0.041*	0.041*	0.041*	0.041*
	(0.023)	(0.023)	(0.023)	(0.023)
$Controls_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	High Yield	High Yield	High Yield	High Yield
Adjusted R^2	0.063	0.064	0.063	0.064
Observations	111311	111311	111311	111311

Table 3: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and high-yield bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month ($Return_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for $Return_{it-1}$, $I(Return<0)_{it-1}$, $I(Return<0)_{it-1} \times Return_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow_{it}			
	(1)	(2)	(3)	(4)
Loan_{it-1} × FG Factor_t	0.717***	0.711***	0.664***	0.660***
	(0.147)	(0.149)	(0.148)	(0.150)
Loan_{it-1} × FFR Factor_t	-2.558	-2.741	-2.548	-2.794
	(1.713)	(1.736)	(1.713)	(1.743)
Loan_{it-1} × -LSAP Factor_t	1.388***	0.966**	1.255***	0.963**
	(0.440)	(0.385)	(0.445)	(0.385)
Loan_{it-1} × VIX_t			-0.097***	-0.068**
			(0.029)	(0.034)
Flow_{it-1}	0.041*	0.041*	0.041*	0.041*
	(0.024)	(0.023)	(0.023)	(0.023)
$\text{Controls}_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	High Yield	High Yield	High Yield	High Yield
Adjusted R^2	0.064	0.064	0.064	0.064
Observations	111311	111311	111311	111311

Table 4: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and high-yield bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021), FFR Factor is the fed funds rate surprise, and −LSAP Factor is the negative of the large scale asset purchase surprise. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month (Return_{it-1}) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return_{it-1}, $\text{I(Return<0)}_{it-1}$, $\text{I(Return<0)}_{it-1} \times \text{Return}_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow_{it}			
	(1)	(2)	(3)	(4)
FG Factor_t	0.163**	0.118*	0.189***	0.127*
	(0.069)	(0.069)	(0.069)	(0.071)
Loan_{it-1} × FG Factor_t	1.049***	1.004***	0.969***	0.996***
	(0.137)	(0.132)	(0.139)	(0.137)
VIX_t			0.035***	0.008
			(0.011)	(0.013)
Loan_{it-1} × VIX_t			-0.103***	-0.007
			(0.029)	(0.039)
Flow_{it-1}	0.049*	0.048*	0.049*	0.048*
	(0.026)	(0.025)	(0.026)	(0.025)
$\text{Controls}_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	N	N	N	N
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	High Yield	High Yield	High Yield	High Yield
Adjusted R^2	0.052	0.053	0.052	0.053
Observations	111311	111311	111311	111311

Table 5: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and high-yield bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month (Return_{it-1}) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return_{it-1}, $\text{I(Return<0)}_{it-1}$, $\text{I(Return<0)}_{it-1} \times \text{Return}_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class fixed effects but no month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$			
	(1)	(2)	(3)	(4)
Loan$_{it-1}$ × FG Factor$_t$	0.824***	0.752**	0.666**	0.652**
	(0.312)	(0.311)	(0.310)	(0.310)
Duration$_{it-1}$ × FG Factor$_t$	0.047	0.033	0.045	0.037
	(0.077)	(0.077)	(0.077)	(0.077)
Loan$_{it-1}$ × VIX$_t$			-0.181***	-0.161***
			(0.036)	(0.038)
Flow$_{it-1}$	0.039	0.039	0.039	0.039
	(0.026)	(0.026)	(0.026)	(0.026)
Controls$_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	High Yield	High Yield	High Yield	High Yield
Adjusted R^2	0.101	0.102	0.102	0.102
Observations	65410	65410	65410	65410

Table 6: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and high-yield bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). Duration is the portfolio duration in years. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), the net expense ratio in percent, and the portfolio duration in years (Duration). In Columns (1) and (3), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return$_{it-1}$, I(Return<0)$_{it-1}$, I(Return<0)$_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	(1) Refinancing	(2) Refinancing	(3) Refinancing
LPC all-in-drawn	-0.0565***	-0.0652***	-0.0747***
	(-4.51)	(-3.61)	(-4.16)
Lagged Sum of Forward Guidance Factors > 0	-0.439***	-0.336***	-0.468***
	(-7.48)	(-5.85)	(-7.73)
Lagged Sum of Forward Guidance Factors > 0 × LPC all-in-drawn	0.0996***	0.0888***	0.0856***
	(6.68)	(6.05)	(5.83)
Log(Facility Amount)	0.557***	0.151***	0.163***
	(40.31)	(6.75)	(7.38)
<= 1 Year to Maturity	0.631***	0.924***	0.987***
	(14.41)	(17.78)	(18.73)
Has a Spread Floor over LIBOR	-0.250***	-0.582***	-0.465***
	(-3.13)	(-5.68)	(-4.54)
Deal Purpose = Corporate Purposes	0.774***	0.275***	0.276***
	(19.74)	(3.06)	(3.09)
Deal Purpose = Debt Repayment	-0.510***	-0.728***	-0.709***
	(-8.10)	(-4.75)	(-4.64)
Deal Purpose = Working Capital	0.812***	0.631***	0.594***
	(9.98)	(3.94)	(3.71)
Deal Purpose = CP Backup	0.0936	0.336	0.305
	(0.30)	(0.60)	(0.54)
Deal Purpose = Takeover, LBO, or Merger	0.162***	0.202*	0.178
	(3.25)	(1.77)	(1.56)
Fixed Effects	None	Borrower	Borrower, Year
Observations	865088	864757	864757

Table 7: Refinancing and monetary policy. Regressions are estimated on a pooled sample of corporate loans. The sample frequency is quarterly, from 2010q1 to 2019q4. The dependent variable is a dummy variable equal to one if loan i is refinanced in quarter t and zero otherwise. LPC all-in drawn is the all-in-drawn spread over LIBOR on the loan. The forward guidance factor is from Swanson (2021) and enters in the regressions as the sum of its monthly observations observed over the three months leading to a refinancing event. Facility Amount is the size in US dollars of the loan; ¡=1 Year to Maturity is a dummy variable equal to one for loans with up to one year left before maturity; spread floor is a dummy variable equal to one if the loan had an interest rate floor; and Deal Purpose is a vector of dummy variables capturing specific stated purposes for the loan (corporate purposes, working capital, M&A financing, CP backup). The regression in column (1) is a pooled OLS, the regression in column (2) includes borrower fixed effects, and the regression in column (3) includes both borrower and year fixed effects. t-statistics using standard errors are clustered at the borrower level are in parentheses. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$			
	(1)	(2)	(3)	(4)
Loan$_{it-1}$ × FG Factor $_t > 0$	-0.453	-0.332	-0.548	-0.426
	(0.543)	(0.565)	(0.543)	(0.549)
Loan$_{it-1}$ × FG Factor $_t < 0$	1.796***	1.603***	1.713***	1.572***
	(0.358)	(0.315)	(0.359)	(0.320)
Loan$_{it-1}$ × VIX$_t$			-0.110***	-0.072**
			(0.028)	(0.033)
Flow$_{it-1}$	0.041*	0.041*	0.041*	0.041*
	(0.023)	(0.023)	(0.023)	(0.023)
Controls$_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	High Yield	High Yield	High Yield	High Yield
Adjusted R^2	0.063	0.064	0.064	0.064
Observations	111311	111311	111311	111311

Table 8: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and high-yield bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor > 0 is equal to the positive part of the forward guidance surprise from Swanson (2021), and FG Factor < 0 is equal to its negative part. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return$_{it-1}$, I(Return<0)$_{it-1}$, I(Return<0)$_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$							
	(1) LIBOR $< 1.5\%$	(2) LIBOR $> 1.5\%$	(3) LIBOR $< 1.5\%$	(4) LIBOR $> 1.5\%$	(5) LIBOR $< 1.5\%$	(6) LIBOR $> 1.5\%$	(7) LIBOR $< 1.5\%$	(8) LIBOR $> 1.5\%$
Loan$_{it-1}$ × FG Factor$_t$	0.730***	2.064***	0.730***	1.227***	0.627***	2.061***	0.615***	1.155***
	(0.145)	(0.202)	(0.146)	(0.201)	(0.150)	(0.202)	(0.155)	(0.201)
Loan$_{it-1}$ × VIX$_t$					-0.115***	-0.057	-0.100**	0.085**
					(0.033)	(0.041)	(0.041)	(0.043)
Flow$_{it-1}$	0.033	0.005	0.033	-0.001	0.033	0.005	0.033	-0.001
	(0.022)	(0.020)	(0.022)	(0.020)	(0.022)	(0.020)	(0.022)	(0.020)
Δ Loan × FG	1.333***		0.496*		1.434***		0.540**	
	(0.252)		(0.254)		(0.255)		(0.259)	
Controls$_{i,t-1}$	Y	Y	Y	Y	Y	Y	Y	Y
Flow-performance	Linear	Linear	Non-linear	Non-linear	Linear	Linear	Non-linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y	Y	Y	Y	Y
Bond-fund Control Group	High Yield	High Yield	High Yield	High Yield	High Yield	High Yield	High Yield	High Yield
Adjusted R^2	0.067	0.146	0.067	0.151	0.067	0.146	0.067	0.151
Observations	91272	19972	91272	19972	91272	19972	91272	19972

Table 9: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and high-yield bond funds (control). The unit of observation is share class-month. The sample period is January 2010-November 2017 (i.e., when LIBOR was below 1.5%) in Columns (1), (3), (5), and (7), and December 2017-June 2019 (i.e., when LIBOR was above 1.5%) in Columns (2), (4), (6), and (8). Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). ΔLoan × FG Factor is the coefficient on the interaction of Loan × FG Factor with a dummy for the period when LIBOR was above 1.5%, obtained from estimating the regressions on the full January 2010-June 2019 sample and interacting all right-hand side variables with the LIBOR $> 1.5\%$ dummy. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1)–(2) and (5)–(6), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (3)–(4) and (7)–(8), we control for Return$_{it-1}$, I(Return<0)$_{it-1}$, I(Return<0)$_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$							
	(1) ZLB	(2) post-ZLB	(3) ZLB	(4) post-ZLB	(5) ZLB	(6) post-ZLB	(7) ZLB	(8) post-ZLB
Loan$_{it-1}$ × FG Factor$_t$	0.704***	1.319***	0.753***	0.907***	0.495***	1.218***	0.449**	0.917***
	(0.161)	(0.230)	(0.164)	(0.217)	(0.168)	(0.217)	(0.177)	(0.212)
Loan$_{it-1}$ × VIX$_t$					-0.226***	-0.105***	-0.261***	0.022
					(0.045)	(0.038)	(0.046)	(0.041)
Flow$_{it-1}$	0.026	0.051**	0.026	0.049**	0.026	0.051**	0.026	0.049**
	(0.023)	(0.024)	(0.023)	(0.024)	(0.023)	(0.024)	(0.023)	(0.024)
Δ Loan × FG	0.615**		0.154		0.723***		0.468*	
	(0.285)		(0.276)		(0.280)		(0.282)	
Controls$_{i,t-1}$	Y	Y	Y	Y	Y	Y	Y	Y
Flow-performance	Linear	Linear	Non-linear	Non-linear	Linear	Linear	Non-linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y	Y	Y	Y	Y
Bond-fund Control Group	High Yield	High Yield	High Yield	High Yield	High Yield	High Yield	High Yield	High Yield
Adjusted R^2	0.066	0.094	0.066	0.097	0.066	0.095	0.066	0.097
Observations	65351	45952	65351	45952	65351	45952	65351	45952

Table 10: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and high-yield bond funds (control). The unit of observation is share class-month. The sample period is January 2010-December 2015 (i.e., during the ZLB period) in Columns (1), (3), (5), and (7), and December January 2016-June 2019 (i.e., after the ZLB period) in Columns (2), (4), (6), and (8). Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). ΔLoan × FG Factor is the coefficient on the interaction of Loan × FG Factor with a dummy for the post-ZLB period, obtained from estimating the regressions on the full January 2010-June 2019 sample and interacting all right-hand side variables with the post-ZLB dummy. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1)–(2) and (5)–(6), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (3)–(4) and (7)–(8), we control for Return$_{it-1}$, $I(\text{Return}<0)_{it-1}$, $I(\text{Return}<0)_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

References

BlackRock, 2019. Policy Spotlight: Non-Bank Lending: A Primer. BlackRock Inc.

Bord, V., and Santos, J., 2012. The Rise of the Originate-to-Distribute Model and the Role of Banks in Financial Intermediation. Economic Policy Review 18(2), 21–34.

Bushman, R., Piotroski, J., and Smith, A., 2011. Captial Allocation and Timely Accounting Recognition of Economics Losses. Journal of Business Finance and Accounting 38(1–2), 1–33.

Celik, S., Demirtas, G., and Isaksson, M., 2020. Corporate Bond Market Trends, Emerging Risks and Monetary Policy. OECD Capital Market Series.

Chen, Q., Goldstein, I., and Jiang, W., 2010. Payoff complementarities and financial fragility: Evidence from mutual fund outflows. Journal of Financial Economics 97, 239–262.

Chevalier, J., and Ellison, G., 1997. Risk Taking by Mutual Funds as a Response to Incentives. The Journal of Political Economy 105(6), 1167–1200.

Christoffersen, S.E.K., and Musto, D.K., 2002. Demand Curves and the Pricing of Money Management. The Review of Financial Studies 15(5), 1499–1524.

Cipriani, M., and La Spada, G., 2020. Sophisticated and Unsophisticated Runs. Federal Reserve Bank of New York Staff Report No. 956.

Dang, T., Gorton, G., and Holmstrom, B., 2015. The Information Sensitivity of a Security. Working Paper.

Federal Reserve Board, 2020. Financial Stability Report –November 2020. Board of Governors of the Federal Reserve System.

Feroli, M., Kashyap, A., Schoenholtz, K., Shin, H., 2014. Market Tantrums and Monetary Policy. Chicago Booth Paper No. 14–19.

Goldstein, I., Jiang, H., and Ng, D., 2017. Investor flows and fragility in corporate bond funds. Journal of Financial Economics 126(3), 592–613.

Holmstrom, B., 2015. Understanding the role of debt in the financial system. Working Papers, Bank for International Settlements.

International Monetary Fund, 2019. Global Financial Stability Report: Vulnerabilities in a Maturing Credit Cycle. International Monetary Fund.

Ippolito, R.A., 1992. Consumer Reaction to Measures of Poor Quality: Evidence from the Mutual Fund Industry. The Journal of Law & Economics 35(1), 45–70.

Kacperczyk, M., and Schnabl, P., 2013. How Safe Are Money Market Funds? Quarterly Journal of

Economics 128(3), 1073–1122.

La Spada, G., 2018. Competition, reach for yield, and money market funds. Journal of Financial Economics 129(1), 87–110.

Kim, S., Plosser, M., and Santos, J., 2018. Macroprudential policy and the revolving door of risk: Lessons from leveraged lending guidance. Journal of Financial Intermediation 34(C), 17–31.

Loan Syndications and Trading Association, 2019.

Massoud, N., Nandy, D., Saunders, A., and Song, K., 2011. Do hedge funds trade on private information? Evidence from syndicated lending and short-selling. Journal of Financial Economics 99(3) , 477–499.

Morningstar, 2020. The Rise and Fall of Bank-Loan Funds: A Morningstar Category grapples with its future. Morningstar, Inc.

Sirri, E.R., and Tufano, P., 1998. Costly Search and Mutual Fund Flows. The Journal of Finance 53(5), 1589–1622.

Smolyansky, M., and Suarez, G., 2021. Monetary policy and the corporate bond market: How important is the Fed information effect? Finance and Economics Discussion Series 2021-010, Board of Governors of the Federal Reserve System.

Swanson, E., 2021. Measuring the Effects of Federal Reserve Forward Guidance and Asset Purchases on Financial Markets. Journal of Monetary Economics 118, 32–53.

Stein, J., 2012. Monetary Policy as Financial Stability Regulation. Quarterly Journal of Economics 127, 57–95.

Stein, J., 2014. Comments on "Market Tantrums and Monetary Policy," a paper by Michael Feroli, Anil K. Kashyap, Kermit Schoenholtz, and Hyun Song Shin. U.S. Monetary Policy Forum, Initiative on Global Markets at the University of Chicago Booth School of Business.

Appendix

In this appendix, we report the results of the paper's regressions when using all corporate bond funds as control group.

	$Flow_{it}$			
	(1)	(2)	(3)	(4)
$Loan_{it-1}$ × FG $Factor_t$	1.128***	1.014***	1.034***	0.966***
	(0.124)	(0.118)	(0.126)	(0.123)
$Loan_{it-1}$ × VIX_t			-0.118***	-0.074**
			(0.025)	(0.038)
$Flow_{it-1}$	0.065***	0.065***	0.065***	0.065***
	(0.019)	(0.019)	(0.019)	(0.019)
$Controls_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	All Corporate	All Corporate	All Corporate	All Corporate
Adjusted R^2	0.061	0.061	0.061	0.061
Observations	351058	351058	351058	351058

Table 11: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and all corporate bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month ($Return_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for $Return_{it-1}$, $I(Return<0)_{it-1}$, $I(Return<0)_{it-1} \times Return_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$			
	(1)	(2)	(3)	(4)
Loan$_{it-1}$ × FG Factor$_t$	0.864***	0.829***	0.803***	0.777***
	(0.132)	(0.132)	(0.133)	(0.135)
Loan$_{it-1}$ × FFR Factor$_t$	-3.577**	-3.661**	-3.572**	-3.729**
	(1.707)	(1.737)	(1.707)	(1.751)
Loan$_{it-1}$ × -LSAP Factor$_t$	1.222***	0.780**	1.074**	0.777**
	(0.432)	(0.375)	(0.442)	(0.375)
Loan$_{it-1}$ × VIX$_t$			-0.109***	-0.077**
			(0.026)	(0.038)
Flow$_{it-1}$	0.065***	0.065***	0.065***	0.065***
	(0.019)	(0.019)	(0.019)	(0.019)
Controls$_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	All Corporate	All Corporate	All Corporate	All Corporate
Adjusted R^2	0.061	0.061	0.061	0.061
Observations	351058	351058	351058	351058

Table 12: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and all corporate bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021), FFR Factor is the fed funds rate surprise, and −LSAP Factor is the negative of the large scale asset purchase surprise. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return$_{it-1}$, I(Return<0)$_{it-1}$, I(Return<0)$_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow_{it}			
	(1)	(2)	(3)	(4)
FG Factor_t	0.047	0.040	0.109***	0.127***
	(0.033)	(0.033)	(0.033)	(0.033)
$\text{Loan}_{it-1} \times \text{FG Factor}_t$	1.161***	1.085***	1.075***	1.021***
	(0.125)	(0.119)	(0.127)	(0.125)
VIX_t			0.087***	0.095***
			(0.006)	(0.007)
$\text{Loan}_{it-1} \times \text{VIX}_t$			-0.120***	-0.064*
			(0.025)	(0.038)
Flow_{it-1}	0.072***	0.072***	0.071***	0.071***
	(0.020)	(0.020)	(0.020)	(0.020)
$\text{Controls}_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	N	N	N	N
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	All Corporate	All Corporate	All Corporate	All Corporate
Adjusted R^2	0.054	0.055	0.055	0.055
Observations	351058	351058	351058	351058

Table 13: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and all corporate bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month (Return_{it-1}) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return_{it-1}, $\text{I(Return<0)}_{it-1}$, $\text{I(Return<0)}_{it-1} \times \text{Return}_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class fixed effects but no month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$			
	(1)	(2)	(3)	(4)
Loan$_{it-1}$ × FG Factor$_t$	0.693***	0.622***	0.551***	0.537***
	(0.163)	(0.159)	(0.157)	(0.156)
Duration$_{it-1}$ × FG Factor$_t$	-0.049**	-0.049**	-0.049**	-0.048**
	(0.021)	(0.021)	(0.021)	(0.021)
Loan$_{it-1}$ × VIX$_t$			-0.176***	-0.153***
			(0.029)	(0.028)
Flow$_{it-1}$	0.078**	0.078**	0.078**	0.078**
	(0.033)	(0.033)	(0.033)	(0.033)
Controls$_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	All Corporate	All Corporate	All Corporate	All Corporate
Adjusted R^2	0.095	0.095	0.095	0.096
Observations	204307	204307	204307	204307

Table 14: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and all corporate bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). Duration is the portfolio duration in years. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), the net expense ratio in percent, and the portfolio duration in years (Duration). In Columns (1) and (3), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return$_{it-1}$, I(Return<0)$_{it-1}$, I(Return<0)$_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$			
	(1)	(2)	(3)	(4)
Loan$_{it-1}$ × FG Factor $_t > 0$	-0.194	-0.122	-0.297	-0.210
	(0.495)	(0.470)	(0.491)	(0.445)
Loan$_{it-1}$ × FG Factor $_t < 0$	1.856***	1.647***	1.767***	1.615***
	(0.331)	(0.287)	(0.335)	(0.296)
Loan$_{it-1}$ × VIX$_t$			-0.119***	-0.079**
			(0.025)	(0.036)
Flow$_{it-1}$	0.065***	0.065***	0.065***	0.065***
	(0.019)	(0.019)	(0.019)	(0.019)
Controls$_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y
Bond-fund Control Group	All Corporate	All Corporate	All Corporate	All Corporate
Adjusted R^2	0.061	0.061	0.061	0.061
Observations	351058	351058	351058	351058

Table 15: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and all corporate bond funds (control). The sample is from January 2010 to June 2019. The unit of observation is share class-month. Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor > 0 is equal to the positive part of the forward guidance surprise from Swanson (2021), and FG Factor < 0 is equal to its negative part. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1) and (3), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (2) and (4), we control for Return$_{it-1}$, I(Return<0)$_{it-1}$, I(Return<0)$_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.

	Flow$_{it}$							
	(1) LIBOR < 1.5%	(2) LIBOR > 1.5%	(3) LIBOR < 1.5%	(4) LIBOR > 1.5%	(5) LIBOR < 1.5%	(6) LIBOR > 1.5%	(7) LIBOR < 1.5%	(8) LIBOR > 1.5%
Loan$_{it-1}$ × FG Factor$_t$	0.899***	1.825***	0.880***	0.920***	0.806***	1.818***	0.798***	0.923***
	(0.129)	(0.186)	(0.130)	(0.176)	(0.134)	(0.186)	(0.149)	(0.174)
Loan$_{it-1}$ × VIX$_t$					-0.103***	-0.121***	-0.075	-0.004
					(0.028)	(0.039)	(0.047)	(0.040)
Flow$_{it-1}$	0.056***	0.032	0.055***	0.030	0.056***	0.031	0.055***	0.030
	(0.019)	(0.021)	(0.019)	(0.021)	(0.019)	(0.021)	(0.019)	(0.021)
Δ Loan × FG	0.926***		0.041		1.012***		0.125	
	(0.230)		(0.227)		(0.233)		(0.235)	
Controls$_{i,t-1}$	Y	Y	Y	Y	Y	Y	Y	Y
Flow-performance	Linear	Linear	Non-linear	Non-linear	Linear	Linear	Non-linear	Non-linear
Flow-performance × Loan	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Share-class FE	Y	Y	Y	Y	Y	Y	Y	Y
Bond-fund Control Group	All Corporate	All Corporate	All Corporate	All Corporate	All Corporate	All Corporate	All Corporate	All Corporate
Adjusted R^2	0.063	0.138	0.063	0.140	0.063	0.138	0.063	0.140
Observations	290415	60473	290415	60473	290415	60473	290415	60473

Table 16: Flow sensitivity to monetary policy shocks. Regressions are estimated on a pooled sample of loan funds (treatment) and all corporate bond funds (control). The unit of observation is share class-month. The sample period is January 2010-November 2017 (i.e., when LIBOR was below 1.5%) in Columns (1), (3), (5), and (7), and December 2017-June 2019 (i.e., when LIBOR was above 1.5%) in Columns (2), (4), (6), and (8). Flow is the net flow as a percentage of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is the forward guidance surprise from Swanson (2021). ΔLoan × FG Factor is the coefficient on the interaction of Loan × FG Factor with a dummy for the period when LIBOR was above 1.5%, obtained from estimating the regressions on the full January 2010-June 2019 sample and interacting all right-hand side variables with the LIBOR > 1.5% dummy. VIX is the monthly average of the daily VIX. Controls is a set of time-varying class-level controls including the loan fund dummy, the natural logarithm of TNA in millions (Log(TNA)), and the net expense ratio in percent. In Columns (1)–(2) and (5)–(6), we control for the net return in the prior month (Return$_{it-1}$) and its interaction with loan-fund dummy (i.e., for a "linear flow-performance relation"). In Columns (3)–(4) and (7)–(8), we control for Return$_{it-1}$, I(Return<0)$_{it-1}$, I(Return<0)$_{it-1}$ × Return$_{it-1}$, and their interactions with the loan-fund dummy (i.e., for a "non-linear flow-performance relation"). All regressions include share-class and month fixed effects. Standard errors (in parentheses) are clustered at the share-class level to control for serial correlation. ***, **, and * represent 1%, 5%, and 10% statistical significance.