Monetary Policy and the Run Risk of Loan Funds

Nicola Cetorelli*

Federal Reserve Bank of New York

E-mail: nicola.cetorelli@ny.frb.gov

Gabriele La Spada*

Federal Reserve Bank of New York

E-mail: gabriele.laspada@ny.frb.gov

João A. C. Santos*

Federal Reserve Bank of New York

and

Nova School of Business and Economics

E-mail: joao.santos@ny.frb.org

October 1, 2021

*We thank Ryan Craver, Catherine Huang, and Doug Leonard for outstanding research assistance. The views stated herein are those of the authors and are not necessarily the views of the Federal Reserve Bank of New York or the Federal Reserve System.

Monetary Policy and the Run Risk of Loan Funds

Abstract

We document empirically that loan funds are more susceptible to run risk than other fixed-income open-end funds, including corporate bond funds. Investor flows in loan funds positively depend on past fund performance, and this sensitivity is between four and seven times higher than that of investor flows in corporate bond funds. Moreover, the higher flow sensitivity only occurs for negative fund performance. We also show that aggregate loan-fund flows are more volatile than bond-fund ones, suggesting that loan funds are more exposed to a common factor than bond funds. Since loan funds mainly hold leveraged loans, and leveraged loans are floating-coupon contracts tied to a short-term reference rate (typically the LIBOR), policy rate increases should be associated with inflows into loan funds and vice versa. Indeed, we document a positive link between monetary policy and loan-fund flows, indicating a pro-cyclical impact of monetary policy in the leveraged lending market, and a novel channel of monetary policy transmission in the broad space of open-end funds.

1 Introduction

Loan funds are mutual funds that invest predominantly in leveraged loans.[1] Leveraged loans are typically used to finance mergers and acquisitions, leveraged buyouts, business recapitalizations, and business expansions. After collateralized loan obligations (CLOs), loan funds are among the largest holders of leveraged loans, representing about 16% of the market at its peak in 2018 (Blackrock, 2019).

Differently from CLOs, however, loan funds engage in significant liquidity transformation. The majority of these funds are open ended, which allows investors to redeem their shares on demand. This at-will redemption optionality, combined with illiquid asset holdings, exposes loan funds to run risk. The reason is that funds face liquidation costs when they readjust their portfolios in response to investor redemptions. Since the portfolio readjustments happen in the days after the redemption, but redeeming investors get the net asset value as of the day of the redemption, fund outflows lead to negative externalities on the remaining shareholders. Such first-mover advantage in the redemption decision amplifies outflows from illiquid funds following bad performance.

In this paper, we study empirically the run risk of loan funds and compare it with that of other fixed-income open-end funds whose runnability has already been established in the literature, such as corporate bond funds. Further, we build on the specific institutional features of loan-fund holdings and study the role of monetary policy in coordinating the redemption decisions of loan-fund investors and in affecting flows in this growing segment of credit-market intermediation.

The first-mover advantage that one would expect to find in loan funds characterizes any investment vehicle engaging in liquidity transformation, and it is indeed well-known and well-documented for the broader category of corporate bond funds (Chen, Goldstein, and Jiang, 2010; Feroli, Kashyap, Schoenholtz, and Shin, 2014); Goldstein,

[1]Leveraged loans account for a sizable share of total lending to non-financial corporations, amounting to about 50% of total commercial loans.

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 illiquid, leveraged loans are typically highly bespoke, complex contracts, which renders them opaque and therefore hard to monitor. The challenges in assessing the underlying performance of their assets should thus lead investors in loan funds to display high sensitivity to performance, especially in bad times. We conjecture that loan-fund investors are more sensitive to the performance of their funds than bond-fund investors, and that this higher sensitivity of investor flows to fund performance is especially strong 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 seven times higher than that of investor flows in corporate bond funds. Moreover, the higher flow sensitivity 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 the loan funds are even more prone to disruptive run-like episodes than bond funds.

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. We relate this evidence to another institutional characteristic that differentiates loan funds from other corporate debt funds. Specifically, while a standard bond is a fixed income security, 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, loan funds' income stream is expected to improve when LIBOR increases and to deteriorate when LIBOR goes down. This institutional characteristic creates a natural link with monetary policy: the existence of an *interest rate channel* whereby policy rate increases should be associated with net flows into loan funds and vice versa.[2]

This effect, in principle, could be offset by another institutional feature of loan-fund holdings: loan borrowers can *renegotiate* their loans when economic conditions change. In particular, if borrowers experience an improvement in their overall conditions, they would have the incentive to refinance and demand better terms, which would decrease loan funds' income stream. This incentive should be especially strong for leveraged loan borrowers, that took their loans at the least favorable terms. This observation has implications for the link with monetary policy as policy rates typically increase in response to improving macroeconomic conditions (Smolyansky and Suarez, 2021). As a result, for loan funds and their investors, the potential benefits associated with monetary policy tightening through the interest rate channel described above may be dampened by leveraged borrowers' tendency to renegotiate as economic conditions improve.

Our empirical results indicate that despite this possible counterveiling effect, there is a positive link between monetary policy and loan-fund flows, thus suggesting 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. To identify the effect of monetary policy on fund flows, we use the measures of policy surprises introduced by Swanson (2021). To strengthen our identification, we also exploit another institutional feature typical of leverage loans. Namely, loan rate resets only occur if the benchmark rate (e.g., LIBOR) crosses a predetermined threshold. We show that, indeed, the positive effect of monetary policy shocks on loan-fund flows is significantly stronger as benchmark rates increase and 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,

[2]This interest rate channel in loan funds goes in the opposite direction we would normally presume for traditional bond funds, for which an interest rate increase (decrease) would be reflected in a valuation loss (gain) for the fixed income securities held in their portfolio, thus suggesting a negative relationship between interest rate movements and bond-fund flows.

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 illiquidity exacerbates the strategic complementarity in open-end funds driving the run-like behavior of investors. Qur results, however, differ from these works as we tie the fragility of loan-fund flows to the specific institutional characteristics that distinguish leveraged loans from bonds and other fixed-income securities.

Our paper also contributes to the body of literature that has directly linked monetary policy with non-bank financial intermediaries, pointing out the emergence of possible conflicts in the dual mandate of economic growth promotion and preservation of financial stability. 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 fundamental destabilizing role of monetary policy on open-end funds flows, describing how the use of forward guidance could lead to acceleration of outflows at the time of interest rate hikes, especially after prolonged periods close to the ZLB (see also Stein, 2014). Such response in bond funds to changes in monetary policy is further documented by Banegas *et al.* (2016). Our results, however, show that the response of loan funds to monetary policy surprises goes in the opposite direction, suggesting a *stabilizing* force. The floating rate nature of the loan contracts directly drive this result.

Finally, our paper has important normative content; it highlights the tension between the natural tendency of financial intermediation to evolve and the need of supervision and regulation to follow, so as to adequately strike a balance between efficiency gains and considerations of financial stability. Loan funds are the closest proxy to an actual banking institution that has emerged from the asset management industry. Not only are they prone to run-like episodes (a feature also shared by bond funds), but their investment holdings are the same assets traditionally held (and created) by banks. The difference with banks, of course, is that (at least in modern times) banks are subject to strict supervision and regulation and enjoy taxpayer-based protection (deposit insurance and access to the lender of last resort). From this perspective then, loan funds are a 21st century bank-like intermediary but subject to 19th century bank-like prudential standards.

2 Institutional Setting and Hypotheses

2.1 Loan fund industry

Bank loan mutual funds hold predominantly leveraged loans. 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). Leveraged lending, however, has grown an order of magnitude faster: the average yearly growth rate has been greater than 14% since 1997, 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 used to fund about 70% of leveraged loans throughout the 1990s, but their share has gradually shrunk and is currently about 10% (IMF, Global Financial Stability Report, 2019). Collateralized Loan Obligations (CLOs) currently fund the lion share, owning about 60% of outstanding leveraged loans.

Open-end loan funds represent the other important segment of the leveraged lending market among institutional investors. 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 leveraged-lending supply 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 structure, 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. Over the years, the secondary loan market has evolved from an inactive market in which dominant investors - banks - would trade on occasion, to an active market with a large and diversified presence of non-bank institutional investors, including CLOs, loan funds, hedge funds, pension funds, brokers, and private equity firms (Bord and Santos, 2012). With the arrival of non-bank investors came a significant rise in trading, which increased from $8 billion in 1991 to $628 billion in 2014, representing a compound annual growth rate of 19.9% (LSTA). Despite this growth, however, the procedure for trading leveraged loans remains 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. Such 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.[3]

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 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 exhibits an even greater concavity than that of bond funds; that is, 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

We exploit two other differences between leveraged loans and bonds – one related to the interest rates and the other related to borrowers' ability to refinance their contracts – that have implications for the loan and bond fund investors.

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

[3]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).

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.

The relationship between interest rates and the income stream of loan funds is also affected by borrowers' ability to refinance leveraged loans 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, 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 and ask for lower spreads.[4] 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. Refinancing at better terms can therefore have a negative impact on the performance of loan funds, counteracting the direct, positive effect associated with increasing rates. The net effect of monetary policy of loan-fund flows is therefore ultimately an empirical question, which leads to the following hypothesis.

Hypothesis 2: Relative to bond-fund flows, monetary policy shocks have a positive effect on loan-fund flows through the interest rate channel and a negative effect through the refinancing channel.

In principle, however, other unobserved factors that co-move with monetary policy could drive a wedge between the flows of loan and bond funds. To 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.

[4]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).

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. In fact, we expect the interest rate channel to be less potent when benchmark rates such as LIBOR are below the loan rate floors, as it was the case during the ZLB period.

Hypothesis 3: Relative to bond-fund flows, the positive effect of monetary policy shocks on loan-fund flows increases as short-term rates increase; that is, the interest-rate channel becomes stronger as monetary authorities tighten policy rates.

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). Our sample 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 funds, high-yield bond funds, and investment-grade corporate bond funds as categorized by Morningstar. In particular, for each share class, we obtain monthly data on the dollar value of net flows, total net assets , returns net of fees, expense ratios, and portfolio duration. 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. To control for the effect of outliers, in each month, we trim the sample at the first and ninety-ninth percentiles of the distributions of flows and returns for each fund category separately.

Table 1 shows basic summary statistics for loan and bond funds. Loan and bond funds are similar in terms of average size (TNA), net returns, and cash holdings. Consistent with their investment mandates, however, the average bond fund holds more corporate bonds (86% 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).[5]

Moreover, 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 average around 12 years among investment grade issuances (Çelik, Demirtaş, and Isaksson, 2020) and between 7 and 10 years among high yield ones (Standard and Poor's, 2007).

3.2 Measuring Changes in Monetary Policy

To measure monetary policy surprises, we use the three-factor decomposition of Swanson (2021). Swanson's factors fit our purposes because we want to capture unexpected changes in monetary policy that affect fund flows. 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, that is, with announcements 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

[5]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 pp and 0.3 pp). Moreover, loan funds tend to have slightly higher expense ratios: 0.98 pp vs. 0.76 pp.

identify the different effects of each policy instrument.[6] Figure 1 from Swanson (2021) shows that the factors, especially the forward guidance and the LSAP ones, display significant variability over time during 2010-2019, which is key for identification purposes, and align well with the main events registered over time.

Since our data on fund flows are monthly, we convert Swanson's factors, which are measured around each FOMC announcement, to monthly frequency. Specifically, for each month, we define monetary policy surprises that are equal the Swanson's factors if a FOMC meeting occurred during that month and equal to zero for months in which there were no FOMC events.

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. In our sample, the best candidate for this purpose is the forward guidance factor. Although the fed funds factor should 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."[7].

The forward guidance factor is also supposed to capture surprises on the future path of the reference rates ("... 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), and reference rates are what matter for loan-contract resets. Hence, the

[6]Rotations of a factor model are observationally equivalent. To separately identify changes in the federal funds rate from forward guidance, he requires that changes in forward guidance have no effect on the current federal funds; 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.

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

forward guidance factor should have a direct impact on expectations of future changes in the 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 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 of leveraged loans and should have no bearing on expectations about loan resets.

For these reasons, in our empirical analysis of loan- and bond-fund flows, we focus on the impact of surprises in forward guidance; for robustness, however, we also control for the concomitant effect 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 more concave than that of bond funds. To do so, similarly to Goldstein *et al.* (2017), we estimate the following regression at the share-class level and monthly frequency

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

where Net 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. $\mathbf{1}\left(\text{Return} < 0\right)$ is a dummy variable for negative returns, and Loan is a dummy variable for share classes belonging to loan funds.[8] Controls is a vector of controls including Loan, 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.[9] 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.

In our baseline specification, regression (1) is estimated on the pooled sample of all corporate bond funds (both investment grade and high yield) and loan funds, from January 2010 to June 2019; results are 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 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

[8] The variable Loan is time varying because, in our sample, a few share classes (20 out of 6,055) switched from being part of a loan fund to being part of a bond fund or vice versa.

[9] 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.

literature.[10]

Namely, for bond funds, a one-standard-deviation increase in net returns leads to a statistically significant increase in monthly flows by 0.3 percentage points (p-value $<$ 0.01).[11] The effect for loan funds is even stronger: the monthly flows increase by additional 1.1 pp (p-value < 0.01). The effect for loan funds is also economically significant, as the standard deviation of monthly flows in our sample is 14 pp.

In principle, the heightened sensitivity of loan-fund flows to fund performance could be due to the higher credit risk of leveraged loans relative to the whole corporate bond sector. To control for this difference, in Column (2), we re-estimate the same regression as in Column (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). Results are largely similar: for one-standard-deviation increase in the past fund's return, monthly flows in a loan fund increase by additional 1.4 pp (p-value < 0.01) relative to a high-yield bond fund.

We now turn to quantifying the differential response of loan-fund flows to bad performance and to testing our hypothesis that they are more exposed to run risk than bond funds. Column (3) of Table 2 shows the results of regression (1) when the control group is all corporate bond funds. First, consistent with Goldstein *et al.* (2017), we show that bond funds exhibit a concave flow-performance relationship: the sensitivity of their outflows to bad performance is significantly greater than that of their inflows to good performance ($\delta_0 = 0.025$, with p-value < 0.01). The slope of their 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 exhibits an even greater concavity than that of bond funds, as shown by the positive

[10] 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.

[11] The in-sample standard deviation of annualized net returns across all fund categories is 16 percentage points (pp).

estimate for δ_1 (0.075, with p-value = 0.04); for loan funds, the difference between the slopes in the negative- and positive-return regions is four times as large as the same difference for bond funds ($\delta_0 + \delta_1 = 0.1$ vs. $\delta_0 = 0.025$). Whereas an increase in positive returns does not lead to any additional inflows relative to bond funds, a one-standard-deviation drop in negative returns leads to additional outflows of 1.2 pp.

As discussed above, this difference between loan and bond funds could be due to the higher credit risk of leveraged loans relative to the typical corporate bonds. For robustness, in Column (4), we estimate regression (1) including only high-yield bond funds as control group. Results are similar: the sensitivity of loan-fund flows to bad performance is much stronger than their sensitivity to good performance ($\delta_0 + \delta_1 = 0.088$); moreover, the differential in flow sensitivity between the negative- and the positive-return regions is significantly larger than for high-yield bond funds ($\delta_1 = 0.107$ with p-value < 0.01). That is, the flow-performance relation of loan funds is concave and significantly more so than that of high-yield 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 performance is deteriorating.

5 Monetary Policy and Loan-Fund Flows

5.1 The Average Effect of Monetary Policy Shocks

The results of Section 4 show that loan funds are even more exposed to run risk than bond funds. Due to the higher illiquidity of loan funds' assets, their investors have a stronger first-mover advantage than bond-fund investors, which amplifies outflows following bad news on fund performance. In this section, we focus on the role of monetary policy shocks as a common factor affecting investors' expectation on the future performance of loan funds, acting therefore as a coordination device that can trigger flow volatility in the whole sector.

In fact, 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 are significantly greater throughout our sample, and this is true for both outflows and inflows. 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 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.

Our Hypothesis 2 suggests a positive relationship between monetary policy and loan-fund flows through an interest rate channel, while acknowledging the existence of a countervailing effect associated with possible renegotiation dynamics. Therefore, the net effect is ultimately an empirical question. To answer this question, we study the impact of monetary policy shocks on loan-fund flows using bond funds as a control group; namely, we estimate the following monthly regression at the share-class level:

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

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 dummy, to control for the effect of past performance and allow for differential effects in loan and bond funds (as documented in the previous section). To control for the different risk profiles of the assets held by loan and bond funds, we also include the interaction of the VIX with the Loan dummy. 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 that of bond-fund flows. We report our results in Table 3; in Column (1), the control group is the entire corporate bond-fund segment. The results show that loan-fund investors are significantly more sensitive to monetary policy shocks than bond-fund investors ($\beta = 1.051$ with p-value < 0.01). This evidence implies a stronger commonality in the flow dynamics of loan funds in 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 1.1 pp relative to those of bond funds.

In principle, as discussed in Section 4, the enhanced sensitivity of loan-fund flows to monetary policy shocks could be due to the higher credit risk of leveraged loans relative to the typical corporate bond. In addition to controlling explicitly for the interaction of the VIX with the loan-fund dummy, Column (3) reports the results of regression (2) restricting the control group to high-yield bond funds. The results are remarkably stable and consistent with those in Columns (1) and (2); relative to high-yield bond funds, a one-standard-deviation increase in the forward guidance factor leads to additional inflows in loan funds by 0.8 pp (p-value < 0.01).

Columns (2) and (4) replicate the results in Columns (1) and (3) when we also include, as controls, the interaction terms of the Loan dummy with the other two types of monetary policy surprises developed by Swanson (2021): the fed funds and LSAP factors. The additional sensitivity of loan-fund flows to changes in forward guidance remains statistically significant and of similar magnitude ($\beta = 0.831$ with p-value < 0.01 and $\beta = 0.587$ with p-value < 0.01).

These results confirm that loan-fund flows are more sensitive to monetary policy shocks than bond-fund ones. They also show that the effect a policy surprise is positive, suggesting that, on average, the interest rate channel dominates over the possible countervailing effect of leveraged lending renegotiation.

5.1.1 Robustness Tests

We run several robustness checks. First, Section 4 shows that the flows of loan funds are more sensitive to bad performance than to good performance, and more so than those of bond funds. 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 Table 4 and close our baseline ones in terms of both statistical and economic significance ($\beta = 0.995$ with p-value < 0.01 when all bond funds are used as control group, and $\beta = 0.803$ with p-value < 0.01 when only high-yield bond funds are the control group).

Second, could our results be driven not by the institutional characteristics of loan-fund holdings, but rather by those of corporate bonds (i.e., the control-group 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 robustness checks.

In Table 5, we estimate regression (2) separately on loan funds, all bond funds, and high-yield bond funds. In principle, the estimated increase in the flow differential between loan and bond funds in response to a positive monetary policy shock could be driven by bond-fund outflows rather than loan-fund inflows. If this were the case, we should see a smaller (or even insignificant) coefficient for the loan-fund segment, and a negative and large coefficient for the bond-fund one. The results do not confirm this.

For loan funds, a one-standard-deviation increase in the forward-guidance factor leads to an increase in monthly monthly flows by 1.079 pp (p-value < 0.01), whereas it has no effect on the flows of corporate bond funds and a significantly positive effect on those of high-yield funds (0.221 pp with p-value < 0.01).

A possible issue with this robustness check, of course, is that we cannot include month fixed effects in these specifications, which means that these results may be affected by concomitant omitted factors correlated with monetary policy shocks. To address this issue, we re-estimate regression (2) controlling for the (lagged) duration of a fund's portfolio. 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.

Results of this robustness check are in Table 6. We run two specifications: one including only the level of portfolio duration (Columns (1) and (3)), and one including the duration level and its interaction with the forward guidance surprise (Columns (2) and (4)). In Columns (1) and (2), the control group is the whole sector of corporate bond funds. Results are very close to our baseline ones: the effect of a one-standard-deviation increase in the forward guidance factor leads loan-fund monthly flows to increase by between 0.5 and 0.8 pp (with p-value < 0.01) relative to bond-fund ones. As expected, the coefficient on the interaction term between portfolio duration and monetary policy surprises is negative, indicating that funds with longer portfolio duration suffer larger outflows after a forward guidance surprise.

In Columns (3) and (4), the control group is only high-yield funds, whose credit-risk profile is similar to that of loan funds. The effect of forward guidance surprises on loan-fund flows remains significantly positive and similar in magnitude. As further robustness check, we control for portfolio duration and its interaction with monetary policy shocks by including a dummy for funds with portfolio duration above the industry median; the median is calculated for each fund type separately, so that there is sufficient variation (i.e., high and low duration) within all fund groups. Results are very similar and can be found in Table 7.

5.2 Rate Floors and the Interest Rate Channel

In this section, we test Hypothesis 3. Namely, we exploit the institutional feature of rate floors typical of leveraged loans 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 8 present 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.

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 choose the threshold between the two periods in a somewhat arbitrary way. In Columns (1) to (4), the split is based 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%. This is true whether we use all corporate bond funds (Column (1) and (2)) or only high-yield funds (Column (3) and (4)) as control group. As an example of economic magnitude, relative to corporate bonds, a one-standard-deviation increase in the forward-guidance factor leads to additional inflows in loan funds by 0.8 pp (p-value < 0.01) when the LIBOR is below 1.5%, and by 1.7 pp (p-value < 0.01) when it is above. The difference when high-yield funds are used as control group is even larger: 0.6 pp (p-value < 0.01) vs. 1.7 pp (p-value < 0.01).

These results are confirmed when the sample is split based on whether interest rates were at the zero-lower bound (ZLB)–i.e., below any floor rate–or not; this is shown in Columns (5) to (8) of Table 8. Regardless of whether loan-fund flows are measured relative to those of all bond funds or only those of high-yield funds, 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 on loan-fund flows of a one-standard-deviation increase in the forward guidance factor goes from 0.5 pp (p-value $<$ 0.01) during the ZLB to 1.1 pp (p-value < 0.01) post-ZLB.

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.

Figures

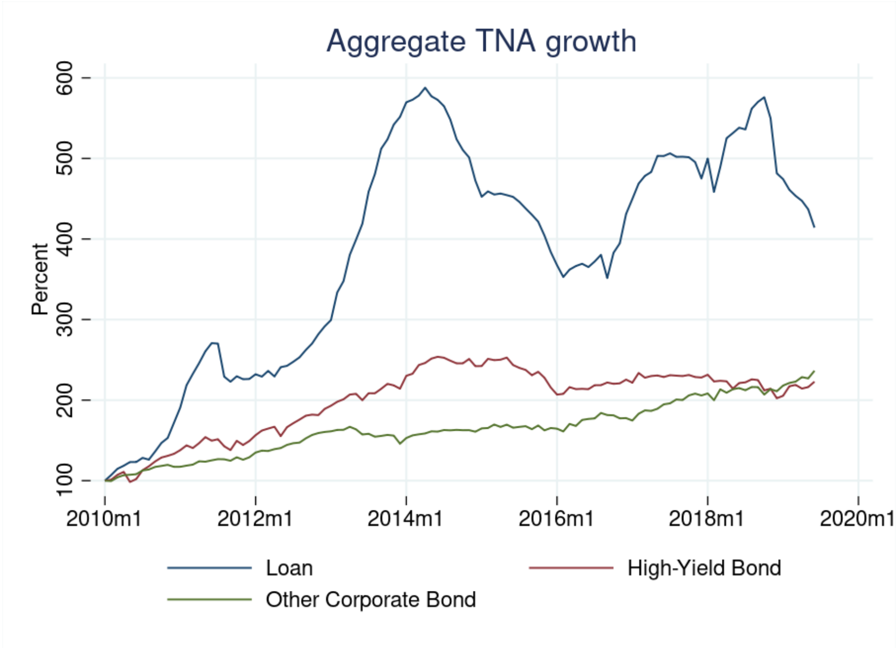
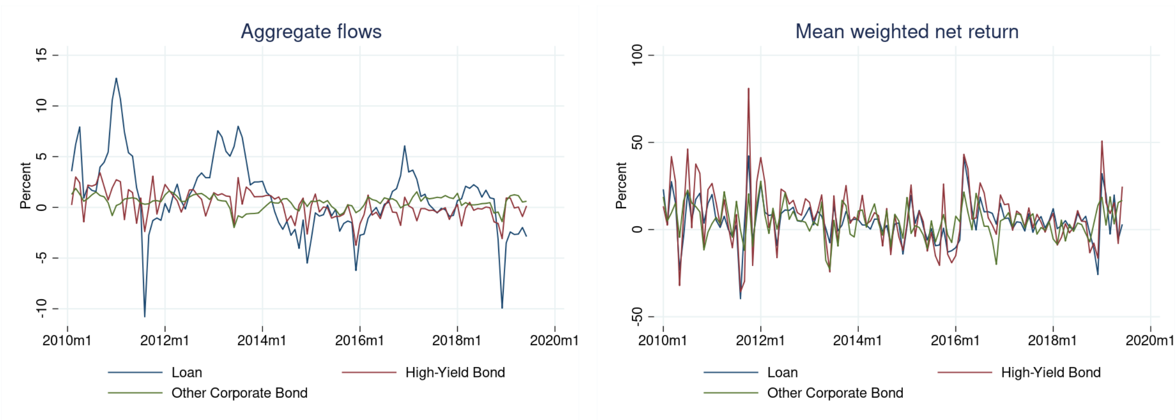


Figure 1: Loan-Fund and Bond-Fund Industry Growth. This figure displays the growth in the monthly total net assets (TNA) of the loan-fund and corporate bond-fund industries, separately. The series are normalized by each industry's TNA in January 2010; the initial value is set to 100.



(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, investment-grade bond funds, and high-yield bond funds. Panel (b) displays the average monthly net return of loan funds, investment-grade bond funds, and high-yield bond funds; the average is weighted using share-class TNA as weights; returns are annualized.

Tables

	(1) Loan funds	(2) Corporate bond funds	Difference
TNA	4773.43	5031.30	-257.87
	(7549.38)	(24644.29)	-(0.22)
Net return	4.89	5.02	-0.13
	(11.60)	(15.53)	-(1.00)
Average duration	0.42	4.02	-3.60^{***}
	(0.38)	(2.06)	(-50.55)
Net expense ratio	0.98	0.76	0.23^{***}
	(0.32)	(0.38)	(6.30)
Loan	72.70	1.69	71.01^{***}
	(23.80)	(5.32)	(57.01)
Bond	17.45	85.57	-68.12^{***}
	(21.84)	(20.29)	(-56.07)
Cash	6.28	6.41	-0.13
	(5.94)	(107.80)	-(0.21)
Equity	0.33	0.64	-0.30^{***}
	(0.86)	(2.77)	-(3.07)
Observations	5,198	115,923	

Table 1: Summary statistics of loan and bond funds at the fund level. TNA is total net assets in each month in millions of USD. Net return is the monthly annualized net return in percent calculated as the asset-weighted mean over the share classes. Average duration is the average duration of the fund's portfolio in years. Net expense ratio is the monthly net expense ratio in percent and calculated as the asset-weighted mean over the share classes. Loan, Bond, Cash, and Equity are the percent of the fund's portfolio held in the respectived asset category each month. Standard deviations are in parentheses. The third column shows the difference in means between the two group of funds with t-statistics in parentheses using standard errors clustered at the fund level. The sample is from January 2010 to June 2019.

	Net flow$_{it}$			
	(1)	(2)	(3)	(4)
	Corporate Bond	High-Yield Bond	Corporate Bond	High-Yield Bond
Net flow$_{it-1}$	0.096***	0.050*	0.095***	0.049*
	(0.031)	(0.027)	(0.031)	(0.026)
Net return$_{it-1}$	0.019***	0.015	0.007***	0.014**
	(0.003)	(0.010)	(0.002)	(0.007)
Loan fund$_{it-1}$	-1.830**	-1.763	-0.940	-0.936
	(0.856)	(1.196)	(0.893)	(1.238)
Loan fund$_{it-1}$ × Net return$_{it-1}$	0.071***	0.086***	0.000	0.010
	(0.011)	(0.011)	(0.029)	(0.028)
I(Net return < 0)$_{it-1}$			-0.278***	-0.442
			(0.068)	(0.273)
I(Net return < 0)$_{it-1}$ × Net return$_{it-1}$			0.025***	-0.019
			(0.006)	(0.019)
Loan fund$_{it-1}$ × I(Net return < 0)$_{it-1}$			-1.703***	-1.448***
			(0.527)	(0.491)
Loan fund$_{it-1}$ × Net return$_{it-1}$ × I(Net return < 0)$_{it-1}$			0.075**	0.107***
			(0.037)	(0.039)
Log(TNA)$_{it-1}$	-1.023***	-2.193***	-1.027***	-2.199***
	(0.078)	(0.264)	(0.078)	(0.265)
Net expense ratio$_{it-1}$	-1.746**	-3.165	-1.731**	-3.124
	(0.717)	(2.010)	(0.712)	(1.989)
Date FEs	Y	Y	Y	Y
Shareclass FEs	Y	Y	Y	Y
Adj. R2	0.0801	0.0656	0.0805	0.0658
Observations	379484	107704	379484	107704

Table 2: Flow-performance relationship in loan and bond funds. Columns (1) and (3) are run on loan fund data with corporate bond bonds used as the control group, while columns (2) and (4) restrict the control group to only high-yield bond funds. Net flow$_{it-1}$ is the lagged monthly estimated net flow as a percentage of the prior month's $(t-2)$ total net assets from Morningstar for share class i. Net return$_{it-1}$ is the lagged monthly annualized net return in percent for share class i. Loan fund$_{it-1}$ is a dummy variable that equals 1 if share class i is a part of a loan fund in the previous month. I(Net return ¡ 0)$_{it-1}$ is a dummy variable that equals 1 if share class i had a negative net return in the previous month. Log(TNA)$_{it-1}$ is the natural logarithm of lagged total net assets in millions for share class i. Net expense ratio$_{it-1}$ is the lagged monthly net expense ratio in percent for share class i. The regression incorporates fixed effects for share class and month and clustered standard errors on the share class level. The sample is from January 2010 to June 2019.

	Net flow$_{it}$			
	(1)	(2)	(3)	(4)
	Corporate Bond	Corporate Bond	High-Yield Bond	High-Yield Bond
Net flow$_{it-1}$	0.095***	0.095***	0.049*	0.049*
	(0.031)	(0.031)	(0.026)	(0.026)
Net return$_{it-1}$	0.019***	0.018***	0.015	0.015
	(0.003)	(0.003)	(0.010)	(0.010)
Loan fund$_{it-1}$	-0.042	0.177	0.409	0.501
	(0.946)	(0.964)	(1.279)	(1.294)
Loan fund$_{it-1}$	0.065***	0.057***	0.077***	0.070***
× Net return$_{it-1}$	(0.011)	(0.010)	(0.011)	(0.011)
Loan fund$_{it-1}$	1.051***	0.820***	0.831***	0.587***
× Forward Guidance Factor$_t$	(0.128)	(0.132)	(0.136)	(0.142)
Loan fund$_{it-1}$		-3.583**		-2.445
× Fed Funds Rate Factor$_t$		(1.697)		(1.709)
Loan fund$_{it-1}$		1.075**		1.272***
× -LSAP Factor$_t$		(0.435)		(0.451)
Loan fund$_{it-1}$	-0.111***	-0.102***	-0.137***	-0.125***
× VIX$_t$	(0.024)	(0.025)	(0.030)	(0.030)
Log(TNA)$_{it-1}$	-1.026***	-1.026***	-2.203***	-2.201***
	(0.078)	(0.077)	(0.265)	(0.264)
Net expense ratio$_{it-1}$	-1.748**	-1.757**	-3.180	-3.189
	(0.718)	(0.716)	(2.013)	(2.007)
Date FEs	Y	Y	Y	Y
Shareclass FEs	Y	Y	Y	Y
Adj. R2	0.0804	0.0805	0.0659	0.0660
Observations	379484	379484	107704	107704

Table 3: Flow sensitivity to monetary policy shocks. Columns (1) and (2) are run on loan fund data with corporate bond bonds used as the control group, while columns (3) and (4) restrict the control group to only high-yield bond funds. Net flow$_{it-1}$ is the lagged monthly estimated net flow as a percentage of the prior month's $(t-2)$ total net assets from Morningstar for share class i. Net return$_{it-1}$ is the lagged monthly annualized net return in percent for share class i. Loan fund$_{it-1}$ is a dummy variable that equals 1 if share class i is a part of a loan fund in the prior month. Forward Guidance Factor$_t$ is the Swanson forward guidance factor for the current month. Fed Funds Rate Factor$_t$ is the Swanson fed funds rate factor for the current month. $-$LSAP$_t$ is -1 times the Swanson large scale asset purchase factor for the current month. VIX$_t$ is the mean of the VIX in month t. Log(TNA)$_{it-1}$ is the natural logarithm of lagged total net assets in millions for share class i. Net expense ratio$_{it-1}$ is the lagged monthly net expense ratio in percent for share class i. The regression incorporates fixed effects for share class and month and clustered standard errors at the share class level. The sample is from January 2010 to June 2019.

	Net $flow_{it}$			
	(1)	(2)	(3)	(4)
	Corporate Bond	Corporate Bond	High-Yield Bond	High-Yield Bond
Net $flow_{it-1}$	0.095***	0.095***	0.049*	0.049*
	(0.031)	(0.031)	(0.026)	(0.026)
Net $return_{it-1}$	0.007***	0.007***	0.013*	0.013*
	(0.002)	(0.002)	(0.007)	(0.007)
Loan $fund_{it-1}$	0.100	0.465	0.456	0.704
	(0.946)	(0.979)	(1.288)	(1.311)
Loan $fund_{it-1}$	0.016	0.015	0.027	0.029
× Net $return_{it-1}$	(0.031)	(0.030)	(0.029)	(0.028)
Loan $fund_{it-1}$	0.995***	0.798***	0.803***	0.592***
× Forward Guidance $Factor_t$	(0.124)	(0.135)	(0.133)	(0.144)
Loan $fund_{it-1}$		-3.758**		-2.698
× Fed Funds Rate $Factor_t$		(1.742)		(1.742)
Loan $fund_{it-1}$		0.829**		1.033***
× -LSAP $Factor_t$		(0.366)		(0.393)
Loan $fund_{it-1}$	-0.075**	-0.078**	-0.100***	-0.102***
× VIX_t	(0.038)	(0.039)	(0.036)	(0.037)
I(Net return ¡ $0)_{it-1}$	-0.286***	-0.284***	-0.467*	-0.462*
	(0.067)	(0.068)	(0.269)	(0.264)
I(Net return ¡ $0)_{it-1}$	0.024***	0.024***	-0.015	-0.015
× Net $return_{it-1}$	(0.006)	(0.006)	(0.018)	(0.018)
Loan $fund_{it-1}$	-1.557***	-1.619***	-1.314***	-1.305***
× I(Net return ¡ $0)_{it-1}$=1	(0.536)	(0.515)	(0.495)	(0.487)
Loan $fund_{it-1}$ × Net $return_{it-1}$	0.032	0.006	0.051	0.023
× I(Net return ¡ $0)_{it-1}$	(0.051)	(0.050)	(0.047)	(0.046)
Net expense $ratio_{it-1}$	-1.735**	-1.745**	-3.138	-3.154
	(0.711)	(0.710)	(1.990)	(1.986)
$Log(TNA)_{it-1}$	-1.028***	-1.027***	-2.203***	-2.201***
	(0.078)	(0.078)	(0.265)	(0.264)
Date FEs	Y	Y	Y	Y
Shareclass FEs	Y	Y	Y	Y
Adj. R2	0.0806	0.0807	0.0660	0.0661
Observations	379484	379484	107704	107704

Table 4: Flow sensitivity to monetary policy shocks, controlling for the full flow-performance relation. Columns (1) and (2) are run on loan fund data with corporate bond bonds used as the control group, while columns (3) and (4) restrict the control group to only high-yield bond funds. Net $flow_{it-1}$ is the lagged monthly estimated net flow as a percentage of the prior month's $(t-2)$ total net assets from Morningstar for share class i. Net $return_{it-1}$ is the lagged monthly annualized net return in percent for share class i. Loan $fund_{it-1}$ is a dummy variable that equals 1 if share class i is a part of a loan fund in the prior month. Forward Guidance $Factor_t$ is the Swanson forward guidance factor for the current month. Fed Funds Rate $Factor_t$ is the Swanson fed funds rate factor for the current month. $-LSAP_t$ is -1 times the Swanson large scale asset purchase factor for the current month. VIX_t is the mean of the VIX in month t. I(Net return ¡ $0)_{it-1}$ is a dummy variable that equals 1 if share class i had a negative net return in the previous month. $Log(TNA)_{it-1}$ is the natural logarithm of lagged total net assets in millions for share class i. Net expense $ratio_{it-1}$ is the lagged monthly net expense ratio in percent for share class i. The regression incorporates fixed effects for share class and month and clustered standard errors at the share class level. The sample is from January 2010 to June 2019.

	Net flow$_{it}$		
	(1)	(2)	(3)
	Loan	Corporate Bond	High-Yield Bond
Net flow$_{it-1}$	0.023	0.203***	0.118***
	(0.025)	(0.006)	(0.014)
Net return$_{it-1}$	0.070***	0.033***	-0.004
	(0.012)	(0.001)	(0.003)
Forward Guidance Factor$_t$	1.079***	0.000	0.221***
	(0.114)	(0.024)	(0.067)
VIX$_t$	-0.151***	0.077***	0.049***
	(0.044)	(0.004)	(0.012)
Log(TNA)$_{it-1}$	-4.706***	-0.713***	-1.820***
	(1.138)	(0.041)	(0.171)
Net expense ratio$_{it-1}$	-10.276	-0.164	1.442**
	(8.199)	(0.289)	(0.695)
Date FEs	N	N	N
Shareclass FEs	Y	Y	Y
Adj. R2	0.0431	0.1464	0.0808
Observations	19548	271774	88155

Table 5: Flow sensitivity to monetary policy shocks by fund type. Columns (1) is run on loan funds, column (2) is run on corporate bond funds (excluding high-yield bond funds), and column (3) is run on high-yield bond funds. Net flow$_{it-1}$ is the lagged monthly estimated net flow as a percentage of the prior month's $(t-2)$ total net assets from Morningstar for share class i. Net return$_{it-1}$ is the lagged monthly annualized net return in percent for share class i. Forward Guidance Factor$_t$ is the Swanson forward guidance factor for the current month. VIX$_t$ is the mean of the VIX for the current month. Log(TNA)$_{it-1}$ is the natural logarithm of lagged total net assets in millions for share class i. Net expense ratio$_{it-1}$ is the lagged monthly net expense ratio in percent for share class i. The regression incorporates fixed effects for share class and clustered standard errors at the share class level. The sample is from January 2010 to June 2019.

	Net flow$_{it}$			
	(1)	(2)	(3)	(4)
	Corporate Bond	Corporate Bond	High-Yield Bond	High-Yield Bond
Net flow$_{it-1}$	0.083**	0.083**	0.038	0.038
	(0.039)	(0.039)	(0.026)	(0.026)
Net return$_{it-1}$	0.017***	0.017***	0.012	0.012
	(0.003)	(0.003)	(0.008)	(0.008)
Loan fund$_{it-1}$	0.538	0.539	0.916	0.916
	(1.095)	(1.095)	(1.401)	(1.401)
Loan fund$_{it-1}$	0.072***	0.072***	0.081***	0.081***
× Net return$_{it-1}$	(0.014)	(0.014)	(0.014)	(0.014)
Loan fund$_{it-1}$	0.767***	0.525***	0.410***	0.443*
× Forward Guidance Factor$_t$	(0.133)	(0.150)	(0.155)	(0.235)
Duration$_{it-1}$	0.094**	0.090**	-0.001	-0.001
	(0.041)	(0.041)	(0.107)	(0.107)
Duration$_{it-1}$ ×		-0.066***		0.012
Forward Guidance Factor$_t$		(0.017)		(0.057)
Loan fund$_{it-1}$	-0.166***	-0.166***	-0.204***	-0.204***
× VIX$_t$	(0.029)	(0.029)	(0.038)	(0.038)
Log(TNA)$_{it-1}$	-1.055***	-1.054***	-2.280***	-2.280***
	(0.081)	(0.081)	(0.294)	(0.294)
Net expense ratio$_{it-1}$	-0.894*	-0.889*	-0.378	-0.378
	(0.531)	(0.530)	(1.145)	(1.145)
Date FEs	Y	Y	Y	Y
Shareclass FEs	Y	Y	Y	Y
Adj. R2	0.1034	0.1035	0.0918	0.0917
Observations	218065	218065	59598	59598

Table 6: Flow sensitivity to monetary policy shocks controlling for portfolio duration Columns (1), (2), (5), and (6) are run on loan fund data with corporate bond bonds used as the control group, while columns (3), (4), (7), and (8) restrict the control group to only high-yield bond funds. Columns (1) and (3) are run for the period where LIBOR is less than 1.5%, and columns (2) and (4) are run where LIBOR is above 1.5%. Columns (5) and (7) are run in the period when interest rates were close to ZLB, and columns (6) and (8) are run in the post-ZLB period. Net flow$_{it-1}$ is the lagged monthly estimated net flow as a percentage of the prior month's $(t-2)$ total net assets from Morningstar for share class i. Net return$_{it-1}$ is the lagged monthly annualized net return in percent for share class i. Loan fund$_{it-1}$ is a dummy variable that equals 1 if share class i is a part of a loan fund in the prior month. Forward Guidance Factor$_t$ is the Swanson forward guidance factor for the current month. Duration$_{it-1}$ is the average duration in years of the fund's portfolio in the previous month. VIX$_t$ is the mean of the VIX for the current month. I(Net return ¡ 0)$_{it-1}$ is a dummy variable that equals 1 if share class i had a negative net return in the previous month. Log(TNA)$_{it-1}$ is the natural logarithm of lagged total net assets in millions for share class i. Net expense ratio$_{it-1}$ is the lagged monthly net expense ratio in percent for share class i. The regression incorporates fixed effects for share class and month and clustered standard errors at the share class level. The sample is from January 2010 to June 2019.

	Net $flow_{it}$			
	(1)	(2)	(3)	(4)
	Corporate Bond	Corporate Bond	High-Yield Bond	High-Yield Bond
Net $flow_{it-1}$	0.083**	0.083**	0.038	0.038
	(0.039)	(0.039)	(0.026)	(0.026)
Net $return_{it-1}$	0.017***	0.017***	0.012	0.012
	(0.003)	(0.003)	(0.008)	(0.008)
Loan $fund_{it-1}$	0.463	0.463	0.975	0.978
	(1.076)	(1.076)	(1.404)	(1.405)
Loan $fund_{it-1}$	0.072***	0.072***	0.081***	0.081***
× Net $return_{it-1}$	(0.014)	(0.014)	(0.014)	(0.014)
Loan $fund_{it-1}$	0.770***	0.768***	0.414***	0.403***
× Forward Guidance $Factor_t$	(0.133)	(0.133)	(0.155)	(0.156)
Above Median $Duration_{it-1}$	-0.201	-0.221	-1.091	-1.146
	(0.557)	(0.565)	(0.783)	(0.792)
Above Median $Duration_{it-1}$		0.245		0.570
× Forward Guidance $Factor_t$		(0.325)		(0.420)
Loan $fund_{it-1}$	-0.166***	-0.166***	-0.205***	-0.205***
× VIX_t	(0.028)	(0.028)	(0.038)	(0.038)
$Log(TNA)_{it-1}$	-1.055***	-1.055***	-2.282***	-2.283***
	(0.081)	(0.081)	(0.294)	(0.294)
Net expense $ratio_{it-1}$	-0.907*	-0.907*	-0.407	-0.411
	(0.532)	(0.532)	(1.150)	(1.151)
Date FEs	Y	Y	Y	Y
Shareclass FEs	Y	Y	Y	Y
Adj. R2	0.1034	0.1034	0.0918	0.0918
Observations	218065	218065	59598	59598

Table 7: Flow sensitivity to monetary policy shocks controlling for portfolio duration Columns (1), (2), (5), and (6) are run on loan fund data with corporate bond bonds used as the control group, while columns (3), (4), (7), and (8) restrict the control group to only high-yield bond funds. Columns (1) and (3) are run for the period where LIBOR is less than 1.5%, and columns (2) and (4) are run where LIBOR is above 1.5%. Columns (5) and (7) are run in the period when interest rates were close to ZLB, and columns (6) and (8) are run in the post-ZLB period. Net $flow_{it-1}$ is the lagged monthly estimated net flow as a percentage of the prior month's $(t-2)$ total net assets from Morningstar for share class i. Net $return_{it-1}$ is the lagged monthly annualized net return in percent for share class i. Loan $fund_{it-1}$ is a dummy variable that equals 1 if share class i is a part of a loan fund in the prior month. Forward Guidance $Factor_t$ is the Swanson forward guidance factor for the current month. Above Median $Duration_{it-1}$ is a dummy equal to one if the fund's duration in the previous month is above the median duration within the relevant fund category. VIX_t is the mean of the VIX for the current month. I(Net return ¡ $0)_{it-1}$ is a dummy variable that equals 1 if share class i had a negative net return in the previous month. $Log(TNA)_{it-1}$ is the natural logarithm of lagged total net assets in millions for share class i. Net expense $ratio_{it-1}$ is the lagged monthly net expense ratio in percent for share class i. The regression incorporates fixed effects for share class and month and clustered standard errors at the share class level. The sample is from January 2010 to June 2019.

	Net flow$_{it}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LIBOR < 1.5%	LIBOR > 1.5%	LIBOR < 1.5%	LIBOR > 1.5%	ZLB	post-ZLB	ZLB	post-ZLB
Net flow$_{it-1}$	0.084***	0.049***	0.040	0.036*	0.072**	0.095***	0.031	0.062**
	(0.031)	(0.011)	(0.024)	(0.020)	(0.033)	(0.014)	(0.025)	(0.026)
Net return$_{it-1}$	0.019***	0.014***	0.011	0.042***	0.022***	0.015***	0.004	0.037***
	(0.003)	(0.003)	(0.012)	(0.007)	(0.004)	(0.002)	(0.016)	(0.007)
Loan fund$_{it-1}$	0.441		0.876		5.092**	2.474***	0.830	2.902***
	(1.026)		(1.461)		(1.991)	(0.845)	(6.586)	(0.791)
Loan fund$_{it-1}$	0.078***	0.011	0.087***	0.025**	0.098***	0.019***	0.087***	0.035***
× Net return$_{it-1}$	(0.014)	(0.010)	(0.014)	(0.010)	(0.020)	(0.007)	(0.020)	(0.008)
Loan fund$_{it-1}$	0.840***	1.747***	0.612***	1.710***	0.918***	1.018***	0.456***	1.090***
× FG Factor$_t$	(0.133)	(0.176)	(0.148)	(0.195)	(0.146)	(0.179)	(0.170)	(0.208)
Loan fund$_{it-1}$	-0.091***	-0.132***	-0.146***	-0.084**	-0.204***	-0.150***	-0.218***	-0.138***
× VIX$_t$	(0.027)	(0.039)	(0.035)	(0.042)	(0.032)	(0.036)	(0.046)	(0.038)
Log(TNA)$_{it-1}$	-1.174***	-1.924***	-2.595***	-2.152***	-1.590***	-1.075***	-3.263***	-1.833***
	(0.096)	(0.239)	(0.326)	(0.456)	(0.151)	(0.128)	(0.486)	(0.410)
Net expense ratio$_{it-1}$	-2.013**	-1.161*	-4.119	-2.771	-3.787**	-0.573	-5.414	-1.245*
	(0.933)	(0.654)	(2.629)	(1.701)	(1.711)	(0.359)	(3.574)	(0.755)
Date FEs	Y	Y	Y	Y	Y	Y	Y	Y
Share-class FEs	Y	Y	Y	Y	Y	Y	Y	Y
Bond-Fund Control	All Corporate	All Corporate	High-Yield	High-Yield	All Corporate	All Corporate	High-Yield	High-Yield
Adj. R2	0.0830	0.1636	0.0687	0.1539	0.0803	0.1302	0.0670	0.1045
Observations	312858	66436	87914	19711	224137	155335	60842	46857

Table 8: Flow sensitivity to monetary policy shocks: the monetary policy stance and the role of rate floors Columns (1) and (2) are run on loan fund data with corporate bond bonds used as the control group, while columns (3) and (4) restrict the control group to only high-yield bond funds. Net flow$_{it-1}$ is the lagged monthly estimated net flow as a percentage of the prior month's $(t-2)$ total net assets from Morningstar for share class i. Net return$_{it-1}$ is the lagged monthly annualized net return in percent for share class i. Loan fund$_{it-1}$ is a dummy variable that equals 1 if share class i is a part of a loan fund in the prior month. FG Factor$_t$ is the Swanson forward guidance factor for the current month. VIX$_t$ is the mean of the VIX for the current month. I(Net return ¡ 0)$_{it-1}$ is a dummy variable that equals 1 if share class i had a negative net return in the previous month. Log(TNA)$_{it-1}$ is the natural logarithm of lagged total net assets in millions for share class i. Net expense ratio$_{it-1}$ is the lagged monthly net expense ratio in percent for share class i. The regression incorporates fixed effects for share class and month and clustered standard errors at the share class level. The sample is from January 2010 to June 2019.

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.

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.