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Monetary Policy, Investor Flows, and Loan Fund Fragility

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Abstract

We find robust evidence indicating a pro-cyclical relationship between monetary policy shocks and loan fund flows. This relationship, however, is asymmetric: weaker for policy rate increases and stronger for policy rate decreases. Further, the effect of monetary policy shocks is stronger when short-term rates are higher. Finally, we document that large outflows from loan funds are associated with a decline in prices in the leveraged loan market. Our results identify a *novel channel of monetary policy transmission* that not only affects a critical segment of the credit sector, but also has the potential to impact financial stability.

Key words: mutual funds, monetary policy, leverage lending

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1 Introduction

The way monetary policy can affect economic activity through *banks* and their role as lenders is well understood. The last decade, however, has seen the rapid growth of nonbank financial institutions as key suppliers of credit. Due to their institutional differences, there is no reason to believe that changes in policy rates will affect nonbanks the same way they affect banks. In this paper, we study the effect of monetary policy on investor flows in bank loan funds, one of the fastest growing nonbank lenders, uncovering important implications for both monetary policy transmission and financial stability.

Loan funds are open-end debt mutual funds that mainly invest in leveraged loans. We focus on these funds because they have experienced spectacular growth over the last decade. As Figure 1 shows, their assets under management have grown at a much higher rate than those of other debt funds. As a result, loan funds are now the largest holders of leveraged loans after collateralized loan obligations (CLOs), becoming an essential lender for a key segment of the credit market (Blackrock, 2019).[1] The effect of monetary policy on loan funds hinges on two unique features of corporate loans: their floating rate nature and the possibility for corporate borrowers to renegotiate their loans at will. Based on these institutional characteristics and the fact that investor flows positively respond to fund performance, we conjecture and empirically test several hypotheses on how loan-fund investors react to unexpected changes in monetary policy. Further, we show that outflows from loan funds, particularly when large, are associated with a negative price effect in the leveraged loan market, which suggests important financial stability

[1] Leveraged loans 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.

implications.

Our starting observation is that monetary policy should positively affect loan funds' performance and therefore investor flows. The reason is that leveraged loans are floating-rate securities, with their coupons tied to a reference short-term rate—typically Libor. Moreover, their rates reset frequently, on a recurrent basis, normally between 30 and 90 days. This creates an *interest rate channel*: unexpected policy rate increases should increase the income stream of loan funds, leading to inflows from investors reaching for income. Conversely, negative shocks should lead to outflows.

There are two challenges to identify this mechanism. First, the response of loan-fund flows to monetary policy may not be due to the specific floating-rate feature of leveraged loans but may simply reflect the effect of monetary policy on investors' risk appetite and, therefore, their overall choice between debt and equity investment. Monetary policy easing leads to "risk on" changes in financial markets, including higher stock returns, lower stock-market volatility, and tighter equity premia (Bernanke and Kuttner, 2005; Bauer, Bernanke, and Milstein, 2023). In particular, low policy rates lead investors to shift from debt to high-dividend equity mutual funds (Daniel, Garlappi, and Xiao, 2021); moreover, the risk-taking channel of monetary policy also affects investor flows within the debt-fund category, depending on the risk profiles of fund portfolios. To control for these effects, we compare loan-fund flows with the flows in the debt funds segment with the closest credit-risk profile: high-yield bond funds.

The second challenge is that we need to identify monetary policy shocks; in particular, we are interested in shocks that affected short-term rates (e.g., LIBOR) in a period (2010-2019) heavily characterized by the zero lower bound (ZLB). To address this issue, we use the monetary-policy surprises introduced by Swanson (2021) to capture changes in forward guidance; these surprise measures allow us to systematically identify shocks in the policy stance that primarily affect short-term rates, even at the ZLB. This identification strategy constitutes the backbone of our baseline specification, whose results are consistent with our prior: we identify a positive relationship between monetary policy shocks and flows in loan funds. Moreover, consistent with our conjecture, we show that monetary policy surprises positively affect loan funds' performance.

To strengthen our identification, we exploit another feature of leveraged loans: the possibility of renegotiation, which suggests that the effect of monetary policy on loan fund flows is likely *asymmetric* for positive and negative shocks. The reason is that borrowers can *renegotiate* their loans and demand better terms—such as lower spreads over the reference rate—when their economic conditions improve. This feature is important for the link between loan funds and monetary policy because policy surprises convey information on economic conditions. Nakamura and Steinsson (2018) show that unexpected tightening has a traditional contractionary effect through an increase in rates, but it also has an expansionary effect through optimistic revisions of expectations about the future of the economy. As a result, a positive monetary policy shock could lead to an increase in the demand for loan renegotiation by leveraged-loan borrowers, which would imply lower spreads and therefore lower income for loan funds. Importantly for our identification purposes, the renegotiation channel is not at work for negative monetary policy shocks. Negative surprises, in fact, suggest deteriorating economic conditions; in this case, borrowers have no incentive to renegotiate their loans and instead benefit from the "more favourable" terms of their existing loans. Consistent with this insight, we show that riskier borrowers are indeed relatively more likely to refinance their loans in periods following positive monetary policy surprises.

Based on this observation, we conjecture that, for loan fund investors, the potential benefits of a positive monetary policy shock through the interest rate channel described above may be dampened by a *renegotiation channel*. However, we do not expect the renegotiation channel to be present when monetary policy surprises are negative. Consistent with this hypothesis, our empirical analysis finds that positive policy shocks have no significant effect on loan-fund inflows, whereas negative shocks lead to significant outflows.

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 is below a certain threshold. This institutional feature 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 are away from the ZLB.

Our results are robust to using all corporate bond funds as control group and to controlling for differential effects of market volatility on investor flows across fund types, as well as for the duration, cash holdings, and average credit rating of fund portfolios. We also show that the effect of monetary policy on bond funds is much smaller in magnitude than that on loan funds, suggesting that our results are not driven by the behavior of flows in the control group. Finally, while most of our analysis is done using monthly flows due to their better data coverage, we show that our results hold when using daily fund flows.

Our findings identify the specific mechanism through which monetary policy affects a key nonbank lender in the leveraged credit market. In particular, they highlight that monetary easing can lead to significant redemption pressure from loan funds. In the second part of our paper, we investigate a potential implication of outflows from loan funds that could pose risks to financial stability.

Outflows, especially when large, put pressure on fund managers to sell some of their assets to meet investor redemptions. Since leveraged loans are illiquid, these sales have likely a negative effect on market loan prices. We find evidence consistent with this insight: outflows from loan funds, especially large ones, are associated with economically important drops in the market price of leveraged loans. While our analysis is not causal, the illiquidity of leveraged loans, together with the importance of loan funds in the leveraged-loan market, suggests that at least a part of the price effect we measure is driven by investor redemptions. We also show that the relationship between drops in market prices and outflows is stronger for loan funds than for bond funds. As we discuss below, this evidence, in conjunction with our findings tying monetary policy to loan-fund flows, creates a novel link between monetary policy and financial stability.

Our paper contributes to the emerging but still small literature on monetary policy and non-bank financial institutions. Stein (2012) argues that monetary policy is a sufficient tool to insure financial stability when regulated banks are the only financial intermediaries, 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; Banegas *et al.*, 2016). Our results, however, identify a distinct relationship between monetary policy and fund flows, showing that loan funds are subject to significant outflows in response to *expansionary* surprises, whereas countervailing effects emerge during tightening periods.

Our results suggest a novel link between monetary policy and financial stability. Although loan funds are not the dominant component of the entire open-end fund industry, significant outflows from the loan fund segment could propagate to the rest of the corporate-debt mutual fund sector. There are two reasons for this. First, 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.[2] Second, large outflows from loan funds appear to depress market loan prices. This price effect will adversely affect all loan investors, including loan funds themselves, with the potential to trigger additional outflows from the industry. If the reduction in market loan prices propagates to related corporate bonds, it has the potential to trigger outflows from the broader

[2] For example, in the context of banks, Chen (1999) shows that the release of negative information on a bank can trigger runs not only by its depositors but also by depositors at 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 to retail investors within the same fund family.

corporate bond fund category and affect financial stability at large.[3]

Our evidence on the link between monetary policy and loan-fund flows also suggests a novel channel of monetary policy transmission through open-end funds in the leveraged lending market. Since loan funds are the second most important funding source of leveraged lending, shocks to their size can have material real effects on this market. 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.[4] Anecdotal evidence from the Covid crisis supports this concern: loan funds experienced aggregate outflows of $14 billion in March 2020, which was estimated to be plenty sufficient to generate a severe dislocation in the primary loan market (S&P Global, 2020).

Finally, our paper contributes to the growing literature documenting that debt mutual funds engage in significant liquidity transformation (Ma, Xiao, and Zeng, 2022a and 2022b). In addition to showing that loan fund outflows are associated with significant drops in market prices, we also document that loan funds' flow-performance relation is highly concave, which can be interpreted as a sign of high runnability due to the mismatch between illiquid assets and liquid (i.e., daily redeemable) liabilities (Goldstein et al., 2017).

The rest of the paper is organized as follows. Section 2 describes the institutional setting and develops our hypotheses. Section 3 describes the identification challenges,

[3]For example, Haddad, Moreira, and Muir (2021), Jiang, Li, Sun, and Wang (2022), and Giannetti and Chotibhak (2022) document that fire sales by mutual funds are associated with a decline in bond prices.

[4]Institutional details governing the operations of the other large player in leveraged lending, collateralized loan obligations (CLOs), seem to corroborate this point: CLO managers are expected to maintain over-collateralization requirements, which become tighter in times of market deterioration. Hence, when loan funds experience disproportionate outflows, it is unlikely that CLOs will have the capacity to buy/absorb new assets (ESMA, 2019).

our empirical strategy, and the data. Section 4 tests our hypotheses on the effects of monetary policy on loan funds' flows. Section 5 investigates the link between loan-fund outflows and market loan prices. Section 6 concludes.

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 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's (or borrower's) rating; others rely on the purpose of the loan (i.e., loans for buyouts, acquisitions, or capital distributions); and yet others 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 $1.1 trillion, with total bank lending to non-financial corporations equal to $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, 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, non-bank lenders have increasingly gained market over time. 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 CLOs and loan funds (Paligorova and Santos, 2018). CLOs currently fund the lion's share of leveraged loans, owning about 60% of outstanding leveraged loans.[5]

Open-end loan funds have become the other key investor in the leveraged loan market. They have grown very significantly from the end of the great financial crisis (GFC): in aggregate, their total net assets (TNA) went from $25 billions (bn) in January 2010 to $144 bn in April 2014, a six-fold increase over less than five years (see Figure 1). 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 $168 bn in 2010 to $415 bn in 2014, a significant but much smaller growth in percentage terms. Since 2014, the size of loan-fund industry has experienced significant volatility, but these funds remain the second largest source of funding in the leveraged loan market (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 about the link between monetary policy and investor flows, and to design our identification strategy.

[5] 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).

2.2.1 Floating rates and monetary policy

A key institutional feature of leveraged loans, is the way their interest rates change over time. 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 tied to a money-market rate (in our sample, mainly the three-month LIBOR) and resets every 30 to 90 days, reflecting changing conditions in short-term rates. For this reason, unexpected changes in monetary policy, for example unexpected increases in the benchmark rate, should have a direct impact on loan funds' performance through an increase in their income stream. Consistent with this intuition, in Appendix A, we show that monetary policy shocks have a positive effect on loan funds' returns.[6]

As a result of this link between monetary policy and loan funds' returns, investors—who tend to chase fund performance and especially income (Daniel et al., 2021)—should flow into loan funds following positive policy surprises and flow out of them following negative ones. We refer to this effect as the interest rate channel of monetary policy on loan fund flows.

Hypothesis 1: Monetary policy positive (negative) shocks have a positive (negative) effect on loan-fund flows through an interest rate channel linked to the rate-reset feature of leveraged loans.

[6]In principle, the increase in cash flows could be offset by an increase in discount rates that would lower the asset's valuation. Our results, however, suggest that the effect on income streams dominate the effect on discount rates, leading to an increase of net returns.

2.2.2 Refinancing and asymmetry between positive and negative shocks

In addition to affecting short-term rates, unexpected changes in monetary policy also convey information on broad economic conditions, leading the public to update its beliefs about the economic outlook (Nakamura and Steinsson, 2018). Specifically, positive policy surprises tend to signal improving macroeconomic conditions, whereas negative ones tend to signal deteriorating conditions.

This information effect of monetary policy is relevant for loan-fund flows because leveraged loans can be renegotiated.[7] Specifically, improving economic conditions may lead to an uptick in refinancing of the loans held by loan funds. As their future prospects improve, borrowers of leveraged loans have an incentive to renegotiate the terms of their outstanding loans and ask for lower spreads.[8] Consistent with this intuition, in Appendix C, we document that the refinancing of riskier loans increases more than that of safer loans after positive monetary policy shocks.

By depressing the spreads on the loans held by loan funds, the renegotiation activity of risky borrowers following positive policy shocks reduces the funds' income streams, counteracting the direct positive effect of increasing rates. Importantly, this counteracting effect should not be present after negative policy surprises. The renegotiation channel, in fact, should only be at work when economic conditions improve; when economic conditions deteriorate, borrowers have no incentive to renegotiate their loans. As a result, we expect the relation between monetary policy and loan-fund flows to be

[7]This contrasts with bonds. In our sample, only 65% of the bonds are callable. Moreover, although bond callability has increased over the years, callable features can be quite restrictive. For example, corporate bonds with 10-year maturity are not callable for the first 5 years; most municipal bonds are only callable 10 years after the bond was issued.

[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).

asymmetric: it should be positive and stronger for negative policy surprises.

Hypothesis 2: The effect of the interest rate channel of monetary policy on loan-fund flows is stronger for negative monetary policy shocks. For positive shocks, it is dampened by borrowers' refinancing activity.

2.2.3 Rate floors and nonlinearity in the rate level

To strengthen our identification of the interest rate channel, we exploit another unique institutional feature of leveraged loans: starting around 2010, leveraged loans increasingly included a rate floor clause in their contracts. The clause generally specifies that the loan rate during the life of the loan should be equal to the pre-specified credit spread plus the greater between the reference rate and the floor. The aim of these clauses was to protect loan holders from 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. 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 our third hypothesis.

Hypothesis 3: The effect of the interest rate channel of monetary policy on loan fund flows is stronger for higher levels of short-term rates.

2.2.4 Loan illiquidity and effect of loan fund outflows on market prices

Several papers show that fire sales by mutual funds lead to severe drops in bond prices because of bonds' illiquidity (Haddad, Moreira, and Muir (2021); Jiang, Li, Sun, and

Wang (2022); Giannetti and Chotibhak (2022)). Leveraged loans are at least as illiquid as corporate bonds; therefore, the link between monetary policy and loan-fund flows highlighted in our Hypotheses 1-3 may also adversely affect loan prices.

First, leveraged loans are informationally opaque. Loans are highly bespoke contracts, characterized by a complex covenant structure and limited information disclosure to market participants. These features are important determinants of leveraged loans' liquidity because informationally opaque securities become sensitive to information acquisition, and therefore less liquid, following a negative shock (Dang *et al.*, 2015; Holmstrom, 2015). Indeed, a 2011 report by Standard and Poor's highlighted a rise in loan-price volatility in the secondary market, supporting anecdotal evidence that syndicate participants trade on private information. Further, Massoud *et al.* (2011), 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.

Second, the procedure used to trade leveraged loans is very complex. 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 (Blackrock, 2019).

Both the opaque nature of leveraged loans and their lengthy settlement process make loan funds' portfolios particularly illiquid, especially in bad times.[9] The illiquidity

[9]Despite loan illiquidity and the consequent liquidity risk that loan funds are exposed to, leveraged loans are permissible

of loan-fund holdings, together with their primary role in the leveraged loan market, suggests that loan-funds' outflows can have negative effects on market-wide prices due to fire-sale pressure, which brings us to our last hypothesis.

Hypothesis 4: Large outflows from loan funds have a negative effect on prices in the leveraged loan market.

3 Identification Strategy and Sample Characterization

Identifying the effect of monetary policy on loan-fund flows through its interest rate channel hinges critically on our ability (i) to isolate this channel from other effects of monetary policy and (ii) to measure monetary policy shocks. We discuss below the importance of these challenges and our approach to address each of them. We end this section with a presentation of our data sources and a brief characterization of our sample.

3.1 Isolating the Interest Rate Effect of Monetary policy

The first identification challenge we need to address is that monetary policy affects not only the level of short-term rates but also investors' sentiment and risk appetite. In particular, the risk-taking channel of monetary policy affects investors' overall choice between equity and debt investments.

Monetary policy easing leads to "risk on" changes in financial markets, including higher stock returns, lower stock-market volatility, and tighter equity premia (Bernanke

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).

and Kuttner, 2005; Bauer, Bernanke, and Milstein, 2023). In particular, low policy rates lead investors to shift from debt to high-dividend equity mutual funds (Daniel, Garlappi, and Xiao, 2021). That is, loan funds may experience outflows after monetary policy easing not because of its impact on their income streams, but because of a shift in investors' portfolios from debt to equity instruments due to a change in risk aversion. Moreover, for the same reason, the risk-taking channel of monetary policy also affects investor flows within the debt-fund category depending on the risk profiles of fund portfolios.

To control for effects related to the effect of monetary policy on investors' risk appetite, we compare loan-fund flows with the flows in the other debt-fund category with the closest credit-risk profile: high-yield corporate bond funds. The bonds held by high-yield funds have a credit risk similar to that of the leveraged loans held by loan funds (Banegas and Goldenring, 2019). By using high-yield bond funds as control group, we control both for the common effect of the risk-taking channel of monetary policy on debt funds relative to equity funds and for its differential effects across debt funds due to funds' different risk exposures. For robustness, we also repeat our analysis using all corporate bond funds as control group (not only high-yield ones); results are unchanged.

3.2 Measuring monetary policy surprises

The second identification challenge is the measurement of monetary policy shocks. To identify the causal effect of monetary policy on fund flows, in fact, it is important to use unanticipated changes in monetary policy. In our setting, this identification is particularly challenging for two reasons: (1) we want to isolate monetary policy shocks that specifically affect short-term rates (i.e., the interest rate channel), and (2) we want to identify such shocks in a sample characterized by a prolonged period at the zero-lower bound (ZLB). To address this issue, we use the forward-guidance monetary policy surprises introduced by Swanson (2021).

Since the great financial crisis (GFC), monetary policy has been implemented with three tools: actual changes in the policy (federal funds) rate; forward guidance providing information regarding the future path of the policy rate; and Large Scale Asset Purchase (LSAP) operations aimed at achieving a broader effect on rates. Using high-frequency (30-minute) asset price responses to FOMC announcements and a structural three-factor model, Swanson (2021) identifies the immediate causal effect of each policy instrument on financial markets.

Because our main data on fund flows are monthly, we convert Swanson's surprises, which are measured around each FOMC announcement, to monthly frequency. For each month, we define monetary policy surprises that are equal to 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. In robustness checks, however, we also use daily data on fund flows and Swanson (2021) original daily shocks.[10]

While monetary policy is executed with three separate instruments, we want to focus on the factor that best captures surprises to the reference rates of leveraged loans in our sample. 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

[10]Morningstar data on fund flows at a daily frequency are only available for a small subset of mutual funds. For this reason, we use monthly data for our main specifications.

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 "the federal funds rate factor remains very small even after 2015, as the FOMC raised rates gradually and very predictably."[11]. In other words, the information content of the fed funds rate factor is small.

In contrast, the forward guidance factor displays significant variation during 2010-2019 and aligns well with the main monetary policy interventions in that period (see Figure 1 in Swanson (2021), pg. 40). Moreover, by construction, the forward guidance factor aims to capture surprises on the path of loans' 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). As a result, forward-guidance surprises should have a material and direct impact on loan funds' income stream in our sample. In Appendix A, we confirm that this is indeed the case.

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 and should therefore have a small effect on loan funds' income.

For these reasons, in our empirical analysis, we focus on the impact of forward-guidance (FG) surprises on fund flows. However, as we show our results are robust to

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

controlling for the concomitant effects of the other two factors.

3.3 Data sources and sample characterization

Our two main data sources are Morningstar and 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. We end in June 2019 because this is the last month for which Swanson (2021) monetary policy measures were available.

We obtain data on loan and corporate bond funds from Morningstar. For each share class, we obtain monthly data on the dollar value of its net flows, total net assets (TNA), returns net of fees, and expense ratios.[12] For a subset of share classes, we also have daily data on their TNA, flows, and returns, which we use in robustness checks. The coverage of these data, however, is sparser, corresponding to 32% to 57% of the monthly sample depending on the fund type. At the fund level (i.e., portfolio level), we obtain information on portfolio duration, portfolio composition in terms of loans, bonds, stocks, and cash, average credit rating of the portfolio, and the share of unrated securities in the portfolio.

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. Following the literature, to mitigate the effect of outliers, we trim flows and returns at the first and ninety-ninth percentiles of their distributions.[13]

[12]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.

[13]We trim flows and returns in each month and for each fund category separately to prevent our sample from being

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) and expense ratio but, consistent with the evidence in Figure 1, the former have experienced larger inflows during our sample period (despite having slightly lower net returns on average). In terms of basic portfolio characteristics, loan funds and bond funds have similar cash holdings, average credit rating, and share of unrated securities. This evidence suggests that high-yield bond funds are a good control group in terms of credit and liquidity risk; the fact that most securities in loan funds' portfolios are rated also suggests that the borrowers in their portfolios are not fundamentally different from those in the portfolios of high-yield bond funds in terms of access to the bond market. Moreover, in our robustness analyses, we will explicitly control for these portfolio-level characteristics.

Consistent with their investment mandates, the main difference between the two fund categories is the type of debt securities in their portfolios: 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).[14] For this reason, loan funds have significantly shorter portfolio duration than bond funds. Corporate bond maturities typically range from one to 30 years. In contrast, loan 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). Further, while bonds are fixed rate securities, leverage loans'

biased towards a specific fund category or time period.

[14]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: 1.5% in high-yield bond funds and 0.3% in loan funds.

rates typically reset every 30 to 90 days (Morningstar, 2020).

4 Monetary Policy and Loan-Fund Flows

As discussed in Section 2, we build on the institutional characteristics of leveraged loans and loan funds to draw specific conjectures related to the role of unexpected changes in monetary policy on investors' flows. In particular, the unique floating-rate nature of leveraged loans suggests that monetary policy positive shocks should affect loan funds' income stream through an interest-rate channel, leading to investors' inflows.

In this section, we test our three hypotheses on the effects of monetary policy on loan funds' flows. Before we do that, we report two findings that speak to the key assumption underlying our hypotheses that investors respond to loan funds' performance. Indeed, in Appendix D, we show that investor flows in loan funds positively respond to fund performance.[15] Interestingly, investors respond more to the performance of loan funds when compared to the performance of other debt mutual funds. Further, in Appendix A, we show that forward guidance surprises have a positive effect of loan funds' net returns. This evidence is reassuring because it suggests that monetary policy shocks may indeed positively affect the income stream of loan funds. We take a close look at this assertion and in particular our thesis that the link between monetary policy and loan-fund flows operates through an interest-rate channel.

[15] There is wide literature documenting that investor flows positively respond to performance for other mutual fund categories. See Ippolito (1992), Chevalier and Ellison (1997), and Sirri and Tufano (1998) for equity mutual funds; Goldstein*et al.* (2017) for bond funds; Christoffersen and Musto (2002), Kacperczyk and Schnabl (2013), and La Spada (2018) for money market funds.

4.1 The effect of monetary policy shocks

Our Hypothesis 1 posits that monetary policy shocks have a positive impact on loan-fund flows through an interest-rate channel. As discussed in Section 3, to isolate this interest-rate channel, it is important to control for the general effect of monetary policy on investors' risk appetite (risk-taking channel), which can affect both their decision to reallocate between equity and debt instruments and their decision to reallocate across debt instruments with different risk profiles. For that reason, in our investigation of Hypothesis 1 we use high-yield bond funds as a control group. For robustness, in Appendix B, we re-estimate our regressions using all corporate bond funds as control group; results are similar.

Specifically, to test Hypothesis 1, we estimate the following monthly regression at the share-class level:

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

where Flow_{it} is the net percentage flow of class i in month t, FG Surprise is the Swanson's forward-guidance surprise (i.e., our proxy for monetary policy shocks), and Loan is a dummy variable for share classes belonging to loan funds.[16] To control for serial correlation, we include lagged flows as a regressor. Controls is a vector of controls including the loan-fund dummy, the logarithm of the class TNA, and the class expense ratio. To control for the effect of past performance and allow for differential effects across loan and bond funds (see discussion in Appendix D), Controls also includes the

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

share class lagged return and its interaction with the loan-fund dummy. 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.

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. Regression (1) is estimated on the pooled sample of high-yield bond funds and loan funds from January 2010 to June 2019. We report the results of this investigation in Table 2. Standard errors are clustered at the share-class level to be robust to serial correlation.

Column (1) reports the base results. It shows that loan-fund investors positively respond to monetary policy shocks ($\beta = 0.996$ with p-value < 0.01). This evidence implies a stronger commonality in the flow dynamics of loan funds because investors are responding to a common factor. The economic magnitude of this estimate is also important: 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 high-yield bond funds.[17]

Columns (2)-(4) report results of two robustness checks. First, we re-estimate regression 1, not only allowing loan-fund and bond-fund flows to have different sensitivities to past performance, but also allowing these sensitivities to be different for positive and negative performance (i.e., returns). The results of this exercise reported in Column (2) are practically identical to those reported in Column (1).

To further control for the risk-taking channel of monetary policy, in addition to using high-yield bond funds as control group, we re-estimate regression (1) including the

[17]In our sample, the standard deviation of the forward-guidance shock is 0.63.

interaction of the VIX with the loan-fund dummy as control. The VIX is a measure of investors' risk aversion and market uncertainty, and it positively responds to monetary policy shocks (Bekaert et al., 2013; Bruno and Shin, 2015). If loan funds tend to hold riskier assets than high-yield bond funds, monetary policy may affect their relative flows through its effect on investors' risk aversion and uncertainty. The interaction between the VIX and the loan-fund dummy should absorb this additional effect due to the risk-taking channel of monetary policy.

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

Table 17 in Appendix B replicates the results of Table 2 using all corporate bond funds as control group. Results are similar: a one-standard deviation increase in the forward-guidance 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 for all specifications considered (i.e., across columns).

Altogether, the results reported in this section show a robust, positive, link between monetary policy shocks and loan-fund inflows. Further, given this finding is unveiled after we control for the effect monetary policy has on investors' risk appetite it likely derives from the interest rate channel of monetary policy, thereby providing support to our Hypothesis 1.

4.2 The dampening effect of refinancing on loan-fund flows

In this section, we investigate our Hypothesis 2, which posits 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. As we noted in Section (2), a distinctive feature of leveraged loans is that they can be renegotiated. Borrowers, especially riskier ones, have strong incentives to refinance their loans during economic upturns: improvement in their financial conditions allows these borrowers to renegotiate the terms of their loans and demand lower spreads.

Since positive monetary policy surprises signal strong economic conditions and affect public perceptions about the outlook of the economy (Nakamura and Steinsson, 2018), we should observe relatively more refinancing activity among the riskier borrowers following positive policy shocks. Consistent with this conjecture, in Appendix C, we document that following positive forward guidance surprises, riskier borrowers are relatively more likely to refinance their loans. This decline in loan spreads would adversely affect the income stream of loan funds and therefore their inflows.

Importantly, the effect of borrowers' refinancing on loan-fund flows is asymmetric: borrowers have no incentive to refinance their loans when economic conditions deteriorate. Since negative monetary policy surprises tend to signal deteriorating economic conditions, 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 in two different periods: a period when Swanson's forward-guidance surprises were mainly positive (January-September 2012) and a period when they were mainly negative (September 2018-June 2019). The figure shows that, when forward-guidance surprises are 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 25% in June 2019), whereas those of high-yield bond funds, after an initial decline, remained roughly stable for the remainder of the period.

To test Hypothesis 2 formally, we run regression 1 splitting monetary policy 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. As for Hypothesis 1, we use high-yield bond funds as control group. The results of this exercise are reported in Table 3 and confirm Hypothesis 2 and the visual evidence in Figure 3. Standard errors are clustered at the share-class level to control for serial correlation.

Positive surprises have no significant differential effect on loan-fund flows (relative to high-yield bond funds); if anything, their estimated effect is mildly negative ($\beta = -0.453$ with p-value $= 0.404$), which is consistent with the negative effect of a renegotiation channel that goes in the opposite direction of the interest rate channel. In contrast, the effect of negative surprises is strong and significant: a one-standard deviation drop in the 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 allow for separate differential effects of positive and negative past performance across fund groups (Column (2)) and when we include the interaction of the VIX with the loan-fund dummy (Columns (3) and (4)). Again, for robustness, Table 18 in Appendix B replicates Table 3 using all corporate bond funds as control group; results are almost identical.

It is worth noting that the asymmetric effects identified above are unlikely driven by confounding dynamics in the control group due to bond callability. As we discussed in Section (2), corporate bonds have increasingly adopted callability options for issuers over the last decade. However, bank loans continue to be easier to renegotiate/refinance than bonds. Further, and more importantly, due to the fixed income nature of the bonds it is unlikely that a bond would be redeemed when interest rates are rising. Potentially, bonds could be called when rates are declining, leading to a drop in the income stream of bond funds. This dynamic, however, would bias our estimates of the effect of negative monetary policy on loan-fund flows downward, towards a non-finding. Therefore, the smaller loan-fund inflows following positive monetary policy surprises identified in this section add support to our Hypothesis 2 that the refinancing activity of risky borrowers when the economic prospects are good dampens the effect of the interest-rate channel of monetary policy on loan-fund flows.

4.3 Rate floors and the interest-rate channel

Finally, in this section, we test Hypothesis 3. Specifically, we exploit the introduction of rate floors in loan contracts 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. With the introduction of these floors, the *level* of interest rates at the time of the monetary policy surprise became important together with the surprise itself for loan-fund flows.

To that end, we run regression (1) 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 4 presents the results of this exercise. Our conjecture is that the effect of monetary policy surprises on loan fund flows 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 resort to a different approach to identify the two periods. We split our sample 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, Columns (1) and (2) show that 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.[18]

These findings are confirmed when we allow for separate differential effects of positive and negative past returns across fund groups (Columns (3) and (4)), and when we add the interaction of the VIX with the loan-fund dummy variable (Columns (5)–(8)). Results are almost identical. Finally, Table 19 in Appendix B replicates Table 4 using all corporate bond funds as control group, obtaining similar results.

In sum, we find evidence that loan-fund flows positively respond to monetary policy shocks, consistent with an interest rate channel put forth in our hypotheses. This effect is asymmetric: while positive surprises have no significant effect on loan-fund flows (consistent with a counteracting effect due loans' renegotiation), negative surprises lead to significant outflows from loan funds. Finally, the strength of the interest rate channel increases with the level of short-term rates, likely due to the presence of rate floors in leveraged loans. Altogether, these results confirm that loan-funds' unique institutional features play a role in monetary policy transmission. In the next subsection, we show that our findings are robust to the presence of several confounding factors.

[18]To test that the difference between the two estimates is statistically significant, we estimate regression (1) on the full sample adding the interactions of all right-hand side variables with a dummy for the period when LIBOR is above 1.5%.

4.4 Robustness Tests

4.4.1 Other monetary policy surprises

We start by repeating our baseline regression for the average effect of monetary policy but this time also controlling for the other two types of monetary policy surprises developed by Swanson (2021): the fed funds rate (FFR) and LSAP factors. Specifically, we re-estimate regression (1) including the interactions of the loan-fund dummy variable with the FFR and LSAP surprises as additional controls.[19] The results of this exercise are reported in Table 5.

The additional sensitivity of loan-fund flows to changes in forward guidance remains similar in magnitude and statistically significant: $\beta = 0.717$ (p-value < 0.01) when controlling for a differential effect of past performance across fund groups, and $\beta = 0.711$ (p-value < 0.01) when allowing for separate differential effects of positive and negative past performance across fund groups. 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, possibly because this factor still captures some variation in the short end of the curve. The effect of fed funds surprises, in contrast, is statistically insignificant across all specifications, probably due to precious little variation of the fed funds factor in our sample (see discussion in Section 3).

[19]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.

4.4.2 Bond valuation and duration risk

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? For example, could it be that our findings derive from an effect of monetary policy on bond values? As interest rates rise, bond prices fall, potentially hurting bond-fund returns. We show that this effect does not drive our results with several checks.

In the first test, we estimate regression (1) without time fixed effects, so as to measure the effect of monetary policy on the flows of both loan and high-yield bond funds. In principle, the estimated positive effect of monetary policy shocks on the flow differential between loan and bond funds 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 6, 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 separate differential effects of positive and negative past returns across fund groups (Column (2)) and to including the interaction of the VIX with the loan-fund dummy (Columns (3) and (4)).

A possible issue with this robustness check, of course, is that, by dropping month fixed effects from regression (1), 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 (1) controlling for the duration of a fund's portfolio and its interaction with the forward-guidance 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 7 and are very close to our baseline results: a one-standard-deviation increase in the forward guidance surprise leads loan-fund monthly flows to an increase of 0.5 pp (p-value < 0.01) relative to those of high-yield bond funds. In Column (2), we control for separate differential effects of positive and negative past returns across fund groups; in Columns (3) and (4), we replicate Columns (1) and (2) adding the interaction of the VIX with the loan-fund dummy. The effect of monetary policy shocks on loan-fund flows remains statistically significant and quantitatively similar.

4.4.3 Controlling for portfolio credit rating and cash holdings

To further control for the risk-taking channel of monetary policy and its confounding effect through differences in funds' risk profiles, we replicate all our results controlling for the lagged average credit rating of fund portfolios. Credit ratings are transformed into numerical values as follows: AAA = 6, ..., B = 1, and below B = 0.

Results are reported in Tables 8–10. Table 8 shows the results of regression (1), estimating the unconditional average effect of monetary policy on loan-fund flows. Results are similar to the baseline ones: for a one-standard-deviation increase in the forward-guidance surprise, loan-fund monthly flows increase by 0.5 pp relative to those of bond funds (p-value < 0.01).

Table 9 confirms that the effect is stronger for negative policy shocks: a one-standard-deviation drop in the forward-guidance surprise leads to outflows from loan funds of 0.9 pp (p-value < 0.01). The effect of positive shocks, in contrast, is negative but insignificant, consistent with the dampening effect of the refinancing channel.

Table 10 confirms that the effect of a monetary policy surprise on loan-fund flows is materially smaller when the LIBOR is below 1.5%: relative to its effect on high-yield bond funds, a one-standard-deviation increase in the forward-guidance surprise increases loan-fund flows by 0.3 pp (p-value < 0.01) when LIBOR is below 1.5% and by 1.2 pp (p-value < 0.01) when LIBOR is above 1.5%, with the difference being significant at the 1% level.

As a further robustness check, we re-estimate the same regressions controlling for lagged percentage of cash holdings in a fund's portfolio. Results are similar and can be found in Tables 11–13.

4.4.4 Using ZLB vs post-ZLB to test the effect of rate floors

In Table 4, to test our hypothesis that the interest rate channel is stronger for higher levels of short-term rates (Hypothesis 3), we arbitrarily chose to split the sample in two periods: when the LIBOR is below or above 1.5% (the average rate floor for the leveraged loans issued in our sample). 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 results of this exercise are reported in Table 14. The ZLB period is defined as January 2010-December 2015. 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 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 allowing for separate differential effects of positive and negative past performance across fund groups (Columns (3) and (4)), and when we add the interaction of the VIX with the loan-fund dummy variable (Columns (5)–(8)).

4.4.5 Using daily data around FOMC announcements

One final concern with our analysis is the frequency mismatch between the monetary policy surprises, which are constructed on a daily basis around FOMC announcements, and the monthly data on fund flows. We focused on monthly fund data because daily data, while available, are much less comprehensive, and recognized to be of lower quality. This exposed us to the aforementioned frequency mismatch and to a potential identification problem. To address this issue, we replicate our baseline results using daily data on fund flows.

We run regression (1) at a daily frequency using $\text{Flow}_{i,t+h}$ as dependent variable, where $\text{Flow}_{i,t+h}$ is fund i's daily flow on day $t+h$; that is, we estimate

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

where $\text{Flow}_{i,t+h}$ is fund i's daily flow on day $t+h$, and FG Surprise_t is Swanson (2021) original forward guidance surprise on day t (i.e., equal to zero if there is no FOMC announcement on that day); all the other right-hand side variables are measured as of day $t-1$; α_i and μ_t are share-class and day fixed effects.

We estimate (2) at different horizons, from $h = 1$ to $h = 26$; we choose $h = 26$ as maximum horizon because the minimum gap between consecutive FOMC announcements in our sample is 27 days. The object of interest is β_h, which measures the effect of a monetary policy surprise on loan-fund flows h days ahead (relative to its effect on the control group).

Panel (a) of Figure 4 shows our estimates of β_h from the daily regression (2), together with their 95% confidence intervals. The estimates are quite noisy, which is not surprising given the low coverage of Morningstar daily data. They do, however, show that the effect of monetary policy shocks on loan-fund flows tends to be positive and statistically significant for the first 18 days after an FOMC announcement; starting from day 19, the effect becomes insignificant on most days. During the first 18 days, the average β_h is around 0.02, indicating that a one-unit drop in Swanson (2021) forward-guidance surprise leads to loan-fund outflows of roughly 0.02 pp per day (relative to high-yield funds). These daily estimates correspond to a cumulative outflow of 0.36 pp over 18 days, which is of the same order of magnitude as our monthly estimates in

Table 2 ($\beta \approx 0.9$).

Although the minimum gap between consecutive FOMC meetings in our sample is 27 days, we also estimate daily regression (2) up to a horizon of 60 days; results are in panel (b) of Figure 4 and show that after the first 18 days, the positive effect of a monetary policy shock on loan-fund flows becomes insignificant through $h = 60$.

Of course, the results in this subsection should be taken with caution due to the low coverage of daily data in the cross-section of funds. They do, however, support the findings from our monthly regressions, suggesting that the frequency mismatch between monthly fund-flow data and daily monetary policy surprises does not drive our results.

5 Implications for the leveraged-loan market

Thus far we have documented that loan funds are sensitive to monetary policy shocks, identifying a link between investor flows in and out of loan funds and monetary policy. Further, our results show that this link is asymmetric: loan-fund investors respond more to negative monetary policy shocks (outflows) than positive ones (inflows). Loan fund redemptions, especially when large, will force loan-fund managers to sell some of their assets; since leveraged loans are highly illiquid, these sales can negatively affect market loan prices. This is our Hypothesis 4, which we test in this section.

Haddad, Moreira, and Muir (2021), Jiang, Li, Sun, and Wang (2022), and Giannetti and Chotibhak (2022) show that, due to bond illiquidity, fire sales by mutual funds negatively affect bond prices. In Section 2, we argued that the opaque nature of leveraged loans together with their lengthy settlement process makes loan funds' portfolios at least as illiquid as bond funds' portfolios.[20] Consistent with this argument, in Appendix D, we show that loan funds' flow-performance relation is concave, and even more so than that of bond funds. Goldstein et al. (2017) interpret the concave flow-performance relation of bond funds as evidence of runnability caused by illiquid asset holdings; our results in Appendix D suggest that loan funds are even more runnable than high-yield bond funds, consistent with their holdings being at least as illiquid.

The illiquid nature of leveraged loans, which implies that trading pressure has a significant price impact, is supported by Figure 5. This figure plots, on the left, the time series of the S&P/LSTA U.S. Leveraged Loan 100 Index together with the cumulative flows in loan funds over the period between January 2012 and January of 2020, and, on the right, the S&P/LSTA US High Yield Corporate Bond Index together with the cumulative flows in high-yield bond funds over the same time period. We use these S&P indexes to capture the prices in the leveraged lending market and high-yield bond market, respectively. Comparing the two figures, we see that prices tend to rise when funds experience inflows and tend to decline when funds experience outflows in both market segments.

To investigate this association more formally and test whether the relationship is tighter in the case of market loan prices, we consider the following model

$$\Delta\text{Price}_{it} = \beta_0\,\text{Flow}_{it} > 0 + \beta_1\,\text{Flow}_{it} < 0 + \theta_0\,\text{Loan}_i \times \text{Flow}_{it} > 0 + \theta_1\,\text{Loan}_i \times \text{Flow}_{it} < 0 \\ + \gamma_0\,\text{Price}_{i,t-1} + \gamma_1\,\text{Loan}_i \times \text{Price}_{i,t-1} + \phi\,\text{Controls}_{it} + \varepsilon_{it}\,, \qquad (3)$$

[20]See Shao and Santos (2022) and Elkamhi and Nozawa (2022) for evidence on loans' illiquidity.

where i represents the debt market segment (i.e., leveraged loans or high-yield bonds) and the corresponding mutual fund market (i.e., loan funds or high-yield bond funds). Price_{it} is the market price in month t, computed by averaging the daily prices. To account for the serial correlation in the price series, we take monthly price changes ($\Delta Price_t$) as dependent variable. $\text{Flow}_{it} > 0$ and $\text{Flow}_t < 0$ represent the dollar amounts of net cash inflows and cash outflows (in billions of U.S. dollars) in the given fund segment during month t. Loan_i is a dummy variable for the loan-fund industry segment.

To further control for serial correlation in prices, we also include the lagged price, $\text{Price}_{i,t-1}$, as a regressor. Controls_t is a vector of controls including FG Surprise (i.e., our proxy for monetary policy shocks) and VIX to absorb the additional effect of changes in monetary policy and in market risk aversion and uncertainty. We control for monetary policy surprises because we aim to isolate the effect of loan-fund outflows from other potential additional loan- and bond-price effects due to monetary policy changes. To allow for the possibility that controls have a differential effect on loan funds relative to high-yield bond funds, we also include the interaction of our controls with the loan-fund dummy.

The coefficients of interest are θ_0 and θ_1; the latter is particularly important because it captures the additional sensitivity of loan prices to loan-fund outflows relative to the similar relationship documented in the high-yield bond-fund segment. Our Hypothesis 4 posits that loan-fund redemptions, especially when large, will put downward pressure on market loan prices. To further understand the effects of large funds' outflows, we consider a variant of regression (3) designed to assess the price effects of monthly flows in the bottom decile of the distribution (i.e., large outflows) in the two market segments. As the previous regressions, regression (3) is estimated from January 2010 to June 2019; standard errors are Newey-West with three lags.

The results of this exercise are reported in Table 15. We begin by estimating regression (3) separately for loan and high-yield bond prices (Columns 1–4). Focusing on outflows, $\text{Flow}_t < 0$, we see that outflows from loan funds are associated with a decline in market loan prices (Column 1). Similarly, we see that outflows from high-yield bond funds are associated with a decline in high-yield bond prices (Column 2). Both effects are strongly statistically significant (p-value < 0.01). The effect is also economically important: in the leveraged-loan market, for example, a one-standard-deviation increase in monthly loan-fund outflows (i.e., 3.1 billion dollars) leads to a 10-point decrease in the monthly price change, amounting to 83% of its in-sample standard deviation; the effect for the high-yield bond market is quantitatively similar.

In Columns (3) and (4), we isolate the effect of the bottom decile of monthly outflows in each fund segment separately. The results show that, while inflows and moderate loan-fund outflows do not seem to have a significant effect on market loan prices, very large outflows are associated with a negative and statistically significant price drop; the coefficient on $\text{Bottom Decile}_t \times \text{Flow}_t$ is positive and statistically significant (p-value < 0.01) in Column (3). In contrast, large high-yield bond outflows do not have a different effect on market bond prices than inflows or moderate outflows, with the coefficient on $\text{Bottom Decile}_t \times \text{Flow}_t$ being statistically insignificant (Column 4).

In Columns (5) and (6) of Table 15, we run regression (3) on the pooled sample of loan and high-yield bond prices and fund flows; the goal is to test if the response of market loan prices to loan funds' outflows (Column 5) and very large outflows (Column 6) is statistically different from the corresponding price responses in the high-yield bond market. We see that the coefficients on both $\text{Loan}_i \times \text{Flow}_{it} < 0$ and $\text{Loan}_i \times \text{Bottom Decile} \times \text{Flow}_{it}$ are positive, and the latter is statistically different from zero (p-value < 0.01). These results show that, when loan funds suffer outflows, especially large ones, these redemptions are associated with a decline in the market loan prices, which is even more significant than the corresponding price response in the high-yield bond market. These results are consistent with our Hypothesis 4 that the illiquidity of loans creates the conditions for price effects of loan funds' fire sales.

While we have not proven that there is a causal link between loan funds' outflows and declines in loan market prices, the illiquid nature of leveraged loans together with the large importance of loan funds in the leveraged-loan market suggests that at least a component of the price effect we identify is likely driven by loan fund managers' fire sales to meet redemptions. This link, together with the evidence we unveiled in the previous section on the effects of negative monetary policy shocks on loan funds' outflows, suggests a novel channel of monetary policy that may have important financial stability implications. A reason is that large reductions in leveraged loan prices will adversely affect loan-fund investors, with the potential to trigger additional outflows from loan funds. As we document in Appendix D, loan funds' flow-performance relation is highly concave, suggesting a high degree of runnability among loan-fund investors. Further, leveraged loan price reductions may have implications that go beyond the loan-fund sector. To the extent that the reduction in loan prices depresses values of closely related assets (e.g., corporate bonds) or loan funds' outflows work as a signal about the performance of all debt mutual funds, then a sharp reduction in leveraged-loan prices has the potential to propagate to bond prices (and therefore bond funds) and threaten financial stability.

Finally, the channel we identified between monetary policy and loan funds' outflows may also play a role on the availability of credit to a fast growing segment of the corporate sector. As we documented in Section (2), not only has the leveraged loan market been growing rapidly, loan funds have been gaining market share and are now the second most important source of funding in that market segment. Consequently, large outflows from loan funds have the potential to hinder borrowers of leveraged loans to raise funding in the primary market. This can be costly because the leveraged loan market is dominated by riskier borrowers, which tend to have access to fewer alternative sources of funding.

6 Final Remarks

Over the last decade, we have observed a diminished role of banks and a parallel growth of non-bank financial institutions as dominant players in key segments of the credit market. To understand how monetary policy is transmitted to credit markets today, it is therefore important to understand how it affects non-bank financial intermediaries. Among these intermediaries, open-end mutual funds have played a particularly significant role in attracting investors' liquidity; and within open-end funds, bank-loan funds are those that have experienced, by far, the fastest growth, and have established themselves as prominent players in the key market segment of leveraged lending.

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, monetary policy shocks affecting short-term rates are an important—common—determinant of loan funds' performance and therefore investors' flows. This architecture suggests a key role for monetary policy in driving loan funds' aggregate flows and their volatility. Our evidence corroborates this hypothesis: loan-fund investors positively respond to monetary policy shocks. However, because leveraged loans can be refinanced and their terms renegotiated, we show that the procyclical relationship between monetary policy and loan-fund flows is asymmetric: it is weaker for positive monetary policy shocks and stronger for negative ones. The reason is that positive shocks indicate improving economic conditions through an information channel, which leads risky borrowers to renegotiation their loans, demanding lower spreads and therefore depressing loan funds' income stream; in contrast, after negative policy shocks (which suggest deteriorating economic conditions), borrowers have no incentive to renegotiate the terms of their loans because the rates adjust automatically. Finally, due to the rate-floor feature, it is also non-linear in the level of the interest 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 paper identifies a novel link between monetary policy and financial stability, documenting the impact of loan-fund outflows on loan market prices. The combination of a negative signal from loan-fund outflows and the decline in loan prices could accelerate a run on loan funds and propagate to other debt funds, with material implications for the broader financial system. Hence, our paper is relevant for the recent literature on the impact of monetary policy on financial stability in systems with a large presence of non-bank intermediaries.

Our paper also adds to the large body of research documenting how the credit channel of monetary policy operates through the banking sector. Our paper suggest that a novel channel may also operate through the nonbank sector. This result is important because nonbanks have become particularly relevant in a segment of the credit market—leveraged lending—where banks' presence has become increasingly smaller. Loan funds, with the flighty nature of their liabilities and the concentration of investments in leveraged loans, are the poster child of such development.

Finally, 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

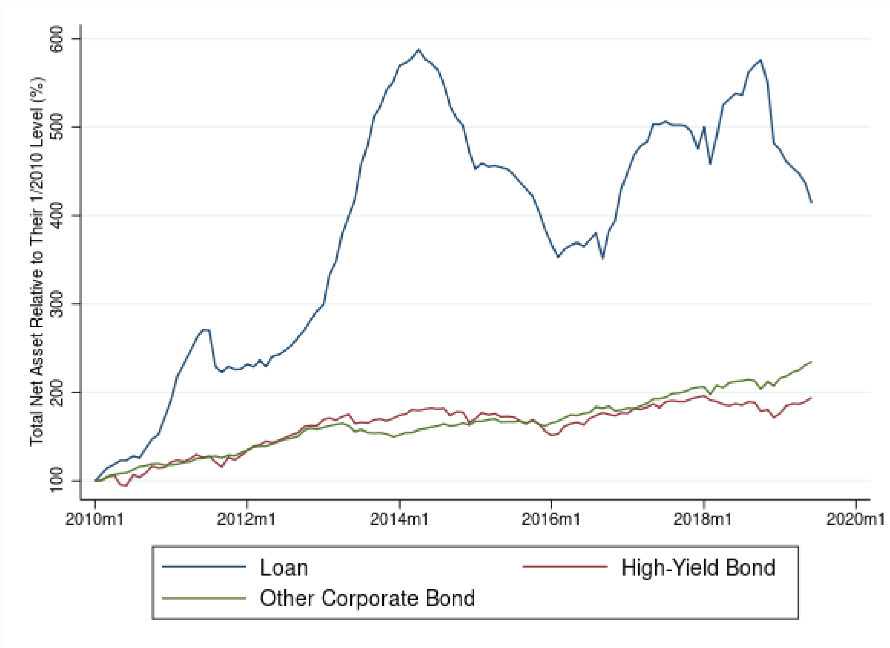
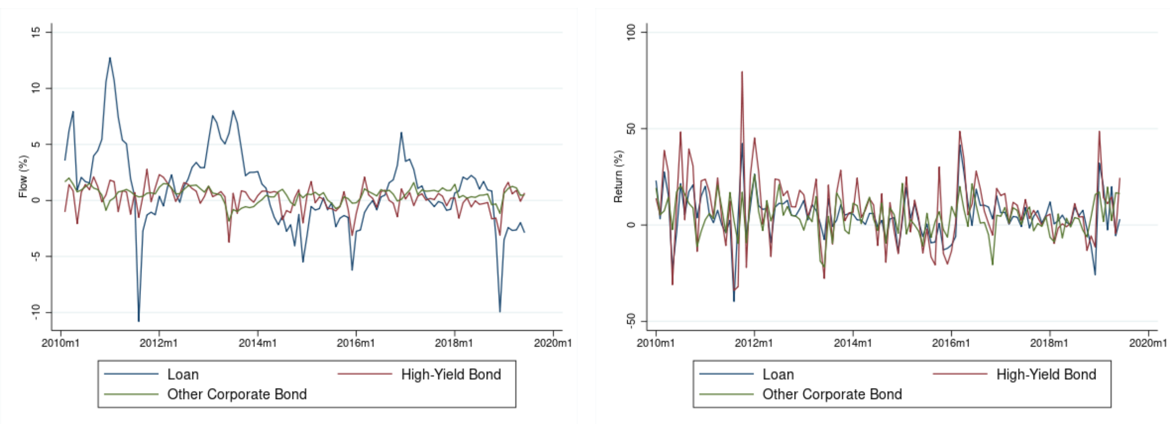


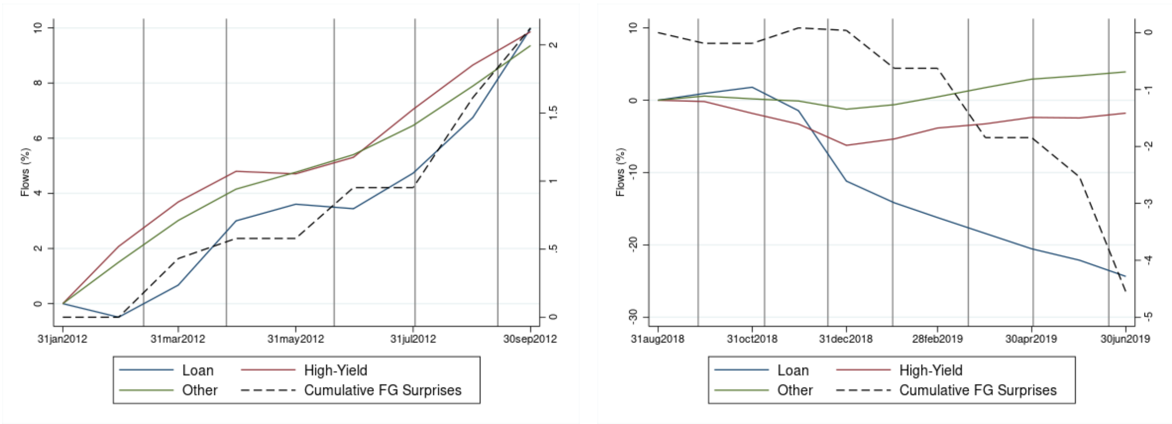
Figure 1: Loan-Fund and Bond-Fund Industry Growth. This figure displays the growth in the monthly total net assets (TNA) of loan funds and corporate bond funds, separately. The series are normalized by each industry's TNA in January 2010; the initial value is set to 100.



(a) Industry Aggregate Net Flows

(b) Industry Average Net Returns

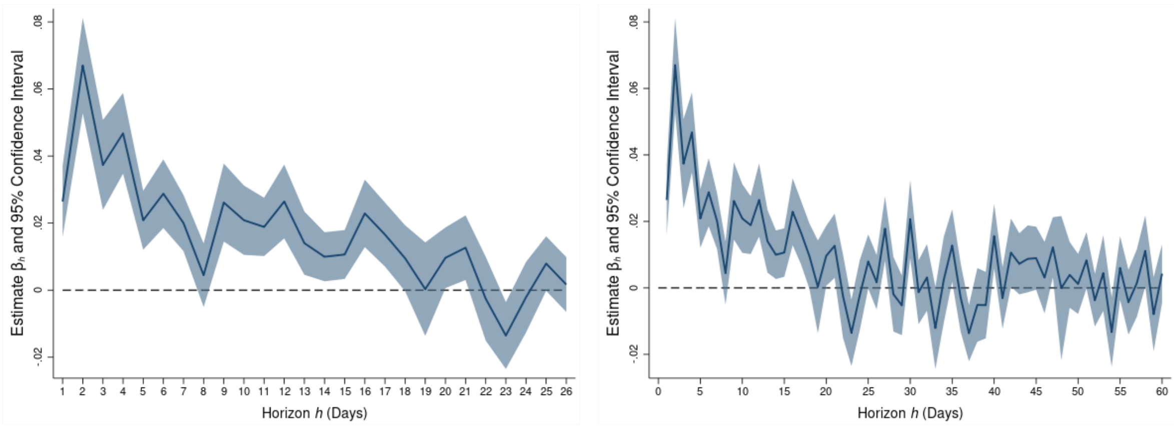
Figure 2: Aggregate Flows and Average Returns in Loan and Bond Funds. Panel (a) displays aggregate monthly net flows as a percentage of the industry total net assets (TNA) in the previous month for loan funds, high-yield bond funds, and other corporate bond funds. Panel (b) displays the weighted average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

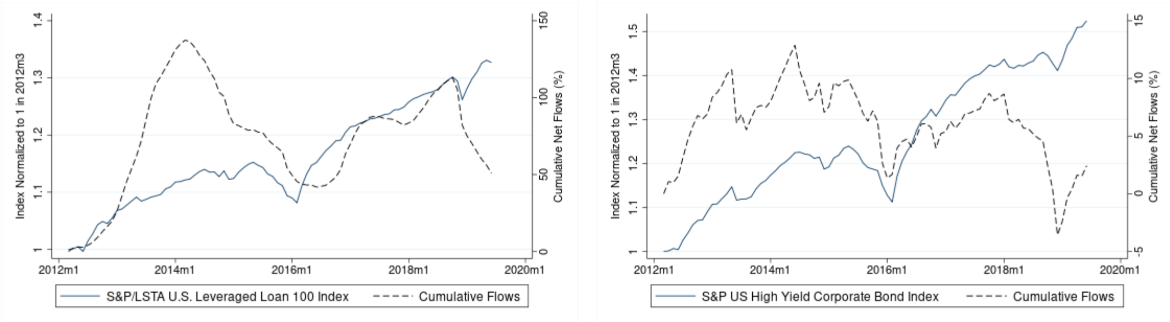
Figure 3: Cumulative Flows and Positive and Negative Forward guidance Surprises. Panel (a) shows the cumulative flows in loan funds, high-yield bond funds, and other corporate bond funds from February to September 2012, as a percentage of each industry's total net assets (TNA) at the end of January 2012. 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).



(a) Up to $h = 26$ days

(b) Up to $h = 60$ days

Figure 4: Effect of monetary policy shocks on loan funds' daily net flows up to h days ahead. Panel (a) shows the estimated β_h from the daily regression (2)—i.e., the effect of a forward guidance surprise on loan funds' daily net flows h days after the shock relative to its effect on the flows of high-yield bond funds—up to $h = 26$ (the minimum gap between consecutive FOMC announcements in our sample is 27 days); panel (b) shows the results of the same estimation up to 60 days after the announcement. The solid line represents the point estimates, the shaded blue area the 95% confidence intervals.



(a) Loan Funds

(b) High-yield Bond Funds

Figure 5: Market Indexes and Cumulative Flows: Loan Funds and High-yield Bond Funds. Panel (a) shows the S&P/LSTA U.S. Leveraged Loan 100 Index normalized to 1 in March 2012, plotted against the cumulative flows in the loan fund industry as a percentage of the industry's total net assets (TNA) in March 2012. Panel (b) shows the S&P/LSTA US High Yield Corporate Bond Index normalized to 1 in March 2012, plotted against the cumulative flows in the high-yield bond fund industry as a percentage of the industry's TNA in March 2012.

Tables

	Loan	High-Yield Bond	Corporate Bond
Share-class Information, Month			
TNA (Millions USD)	515.24	495.15	676.64
	(1106.90)	(1732.62)	(3555.81)
Flow (Percent)	3.26	1.32	1.20
	(40.35)	(14.35)	(13.53)
Expense ratio (Percent)	1.14	1.09	0.95
	(0.45)	(0.47)	(0.48)
Net return (Percent)	4.72	7.32	5.05
	(11.64)	(19.38)	(16.44)
Observations	20889	98151	356291
Unique Share-classes	285	1537	5340
Fund-Portfolio Information, Month			
Average credit rating (0-6)	1.13	1.37	2.83
	(0.41)	(0.57)	(1.29)
Share of unrated securities (Percent)	3.16	3.92	2.62
	(4.56)	(5.21)	(5.97)
Cash (Percent)	6.28	5.63	5.75
	(5.94)	(11.26)	(111.25)
Loan (Percent)	72.70	4.57	1.53
	(23.80)	(8.64)	(5.06)
Bond (Percent)	17.45	82.64	87.27
	(21.84)	(16.94)	(17.60)
Equity (Percent)	0.33	1.50	0.57
	(0.86)	(3.63)	(2.41)
Average duration (Years)	0.42	3.77	4.14
	(0.38)	(1.20)	(2.01)
Observations	5198	28310	107688
Unique Funds	69	415	1467

Table 1: Summary statistics of loan and bond funds at the share-class and fund level. 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. Average credit rating is the monthly average credit rating of the fund's portfolio, coded AAA=6, AA=5, A=4, BBB=3, BB=2, B=1, Below B=0. Share unrated is the monthly unrated share 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 sample is from January 2010 to June 2019.

	Flow_{it}			
	(1)	(2)	(3)	(4)
$\text{Loan}_{it-1} \times \text{FG Factor}_t$	0.996***	0.914***	0.910***	0.865***
	(0.136)	(0.132)	(0.138)	(0.134)
$\text{Loan}_{it-1} \times \text{VIX}_t$			-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)
$\text{Controls}_{i,t-1}$	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	0.063	0.064	0.063	0.064
Observations	111311	111311	111311	111311

Table 2: 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. The dependent variable, 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 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 $_t > 0$	-0.453	-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 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. The dependent variable, 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 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 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). The dependent variable, 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)	(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 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. The dependent variable, 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)
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 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. The dependent variable, 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)$_{it-1}$ × 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 7: 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. The dependent variable, 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$_t$	0.759***	0.727***	0.604***	0.604***
	(0.155)	(0.151)	(0.153)	(0.151)
Loan$_{it-1}$ × VIX$_t$			-0.185***	-0.166***
			(0.034)	(0.035)
CR$_{it-1}$	0.168	0.175	0.256	0.246
	(0.256)	(0.257)	(0.257)	(0.259)
Flow$_{it-1}$	0.039	0.038	0.039	0.038
	(0.025)	(0.025)	(0.025)	(0.025)
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	0.098	0.098	0.098	0.099
Observations	68273	68273	68273	68273

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. The dependent variable, 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. CR is the average credit rating of a fund's portfolio, where credit ratings are transformed into numerical values as follows: AAA = 6, . . . , B = 1, and below B = 0. 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)
Loan$_{it-1}$ $\times$ FG Factor > 0	-0.355	-0.094	-0.518	-0.334
	(0.375)	(0.370)	(0.377)	(0.371)
Loan$_{it-1}$ $\times$ FG Factor < 0	1.448***	1.234***	1.298***	1.176***
	(0.259)	(0.246)	(0.256)	(0.246)
Loan$_{it-1}$ $\times$ VIX$_t$			-0.186***	-0.172***
			(0.034)	(0.036)
CR$_{it-1}$	0.156	0.165	0.245	0.237
	(0.256)	(0.256)	(0.257)	(0.258)
Flow$_{it-1}$	0.039	0.038	0.038	0.038
	(0.025)	(0.025)	(0.025)	(0.025)
Controls$_{i,t-1}$	Y	Y	Y	Y
Flow-performance	Linear	Non-linear	Linear	Non-linear
Flow-performance $\times$ 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	0.098	0.098	0.098	0.099
Observations	68273	68273	68273	68273

Table 9: Flow sensitivity to monetary policy shocks: positive vs negative shocks, controlling for portfolio's credit rating. 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. The dependent variable, 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. CR is the average credit rating of a fund's portfolio, where credit ratings are transformed into numerical values as follows: AAA = 6, . . . , B = 1, and below B = 0. 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 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LIBOR $<$ 1.5%	LIBOR $>$ 1.5%	LIBOR $<$ 1.5%	LIBOR $>$ 1.5%	LIBOR $<$ 1.5%	LIBOR $>$ 1.5%	LIBOR $<$ 1.5%	LIBOR $>$ 1.5%
$\text{Loan}_{it-1} \times \text{FG Factor}_t$	0.453***	1.938***	0.483***	1.220***	0.278	1.925***	0.246	1.198***
	(0.166)	(0.259)	(0.166)	(0.273)	(0.170)	(0.259)	(0.173)	(0.273)
$\text{Loan}_{it-1} \times \text{VIX}_t$					-0.195***	-0.076	-0.213***	0.028
					(0.040)	(0.049)	(0.045)	(0.049)
CR_{it-1}	-0.047	1.560***	-0.031	1.436***	0.068	1.556***	0.068	1.433***
	(0.308)	(0.447)	(0.307)	(0.445)	(0.310)	(0.446)	(0.311)	(0.445)
Flow_{it-1}	0.031	0.029	0.031	0.024	0.031	0.029	0.031	0.024
	(0.021)	(0.023)	(0.021)	(0.024)	(0.021)	(0.023)	(0.021)	(0.024)
Δ Loan $\times$ FG	1.485***		0.736**		1.647***		0.952***	
	(0.327)		(0.334)		(0.330)		(0.337)	
$\text{Controls}_{i,t-1}$	Y	Y	Y	Y	Y	Y	Y	Y
Flow-performance	Linear	Linear	Non-linear	Non-linear	Linear	Linear	Non-linear	Non-linear
Flow-performance $\times$ 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	0.107	0.135	0.107	0.140	0.108	0.135	0.108	0.140
Observations	55264	12943	55264	12943	55264	12943	55264	12943

Table 10: Flow sensitivity to monetary policy shocks: dependence on the level of short-term rates, controlling for portfolio's credit rating. 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. The dependent variable, 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. CR is the average credit rating of a fund's portfolio, where credit ratings are transformed into numerical values as follows: AAA = 6, . . . , B = 1, and below B = 0. 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}, $\text{I(Return<0)}_{it-1}$, $\text{I(Return<0)}_{it-1} \times \text{Return}_{it-1}$, 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.

	(1)	(2)	(3)	(4)
$\text{Loan}_{it-1} \times \text{FG Factor}_t$	0.639***	0.638***	0.493***	0.530***
	(0.155)	(0.151)	(0.154)	(0.150)
$\text{Loan}_{it-1} \times \text{VIX}_t$			-0.177***	-0.146***
			(0.035)	(0.037)
Cash_{it-1}	5.843***	5.694***	5.900***	5.766***
	(1.685)	(1.685)	(1.688)	(1.689)
Flow_{it-1}	0.034*	0.033*	0.033*	0.033*
	(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	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	0.102	0.102	0.102	0.103
Observations	65518	65518	65518	65518

Table 11: 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. The dependent variable, 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. Cash is the percentage of cash holdings in a fund's portfolio. 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.

	(1)	(2)	(3)	(4)
$\text{Loan}_{it-1} \times$ FG Factor > 0	-0.671*	-0.361	-0.832**	-0.583
	(0.369)	(0.362)	(0.370)	(0.362)
$\text{Loan}_{it-1} \times$ FG Factor < 0	1.461***	1.265***	1.322***	1.219***
	(0.253)	(0.242)	(0.251)	(0.242)
$\text{Loan}_{it-1} \times \text{VIX}_t$			-0.178***	-0.154***
			(0.035)	(0.037)
Cash_{it-1}	5.715***	5.610***	5.771***	5.677***
	(1.679)	(1.680)	(1.682)	(1.685)
Flow_{it-1}	0.033*	0.033*	0.033*	0.033*
	(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	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	0.102	0.103	0.103	0.103
Observations	65518	65518	65518	65518

Table 12: 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. The dependent variable, 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. Cash is the percentage of cash holdings in a fund's portfolio. 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LIBOR < 1.5%	LIBOR > 1.5%	LIBOR < 1.5%	LIBOR > 1.5%	LIBOR < 1.5%	LIBOR > 1.5%	LIBOR < 1.5%	LIBOR > 1.5%
$\text{Loan}_{it-1} \times \text{FG Factor}_t$	0.304*	1.980***	0.374**	1.230***	0.129	1.965***	0.140	1.200***
	(0.169)	(0.250)	(0.167)	(0.262)	(0.174)	(0.249)	(0.175)	(0.261)
$\text{Loan}_{it-1} \times \text{VIX}_t$					-0.198***	-0.065	-0.204***	0.041
					(0.042)	(0.047)	(0.047)	(0.047)
Cash_{it-1}	7.251***	3.355*	7.196***	2.651	7.358***	3.389*	7.337***	2.613
	(2.193)	(1.932)	(2.198)	(1.970)	(2.201)	(1.936)	(2.208)	(1.976)
Flow_{it-1}	0.026	0.023	0.026	0.018	0.026	0.023	0.026	0.018
	(0.017)	(0.023)	(0.017)	(0.024)	(0.017)	(0.023)	(0.017)	(0.024)
Δ Loan × FG	1.676***		0.857***		1.836***		1.059***	
	(0.319)		(0.324)		(0.323)		(0.328)	
$\text{Controls}_{i,t-1}$	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	0.112	0.144	0.112	0.149	0.112	0.144	0.112	0.149
Observations	51284	14164	51284	14164	51284	14164	51284	14164

Table 13: 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. The dependent variable, 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. VIX is the monthly average of the daily VIX. FG Factor is the forward guidance surprise from Swanson (2021). Cash is the percentage of cash holdings in a fund's portfolio. 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}, $\text{I(Return<0)}_{it-1}$, $\text{I(Return<0)}_{it-1} \times \text{Return}_{it-1}$, 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) 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 14: 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). The dependent variable, 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(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)	(2)	(3)	(4)	(5)	(6)
$\text{Flow}_t > 0$	-0.758	2.895***			2.895***	
	(0.511)	(0.860)			(0.860)	
$\text{Flow}_t < 0$	3.125***	2.608***			2.608***	
	(0.743)	(0.425)			(0.425)	
Flow_t			-0.093	2.977***		2.977***
			(0.476)	(0.535)		(0.535)
$\text{Bottom Decile}_t \times \text{Flow}_t$			3.022***	-0.512		-0.512
			(0.923)	(0.742)		(0.742)
$\text{Loan}_i \times \text{Flow}_t > 0$					-3.653***	
					(1.000)	
$\text{Loan}_i \times \text{Flow}_t < 0$					0.517	
					(0.855)	
$\text{Loan}_i \times \text{Flow}_t$						-3.071***
						(0.715)
$\text{Bottom Decile}_t \times \text{Loan}_i \times \text{Flow}_t$						3.534***
						(1.184)
Constant	34.824**	25.117**	36.631**	25.667**	25.117**	25.667**
	(17.270)	(12.626)	(17.688)	(11.454)	(12.626)	(11.454)
$\text{Price}_{i,t-1}$	Y	Y	Y	Y	Y	Y
Controls_t	Y	Y	Y	Y	Y	Y
Sample	Loan	High Yield	Loan	High Yield	Loan + HY	Loan + HY
Adjusted R^2	0.341	0.604	0.340	0.607	0.528	0.529
Observations	113	113	113	113	226	226

Table 15: Effect of Fund Flows on Market Prices. The depend variable is $\Delta Price_{it}$, where Price_{it} is the loan or high-yield bond market prices in month t computed as the monthly average of the S&P/LSTA U.S. Leveraged Loan 100 Index and the monthly average of the S&P/LSTA US High Yield Corporate Bond Index, respectively. Regressions are estimated on the sample of loan funds in Columns (1) and (3), the sample of high-yield bond funds in Columns (2) and (4), and on the pooled sample of the two in Columns (5) and (6). The unit of observation is fund-segment-month, and the sample period is January 2010 to June 2019 for all regressions. $\text{Flow}_t > 0$ and $\text{Flow}_t < 0$ are variables that capture the dollar amounts of cash inflows and cash outflows (in billions of U.S. dollars), respectively, the fund segment experienced over the month t. Flow is the net flow of the prior month's total net assets (TNA). Loan is a dummy variable equal to one for loan-fund share classes. Bottom Decile is a dummy variable equal to 1 for the bottom decile of monthly outflows in the two market segments. Controls_t includes VIX, the monthly average of the daily VIX and FG Factor, the forward guidance surprise from Swanson (2021). Regressions of Columns (5) and (6) also include the interaction of our controls with the loan-fund dummy to allow for the possibility that controls have a differential effect on loan funds relative to high-yield bond funds,. Newey-West standard errors with three lags are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% statistical significance.

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Online Appendix

Appendix A Monetary Policy and Loan Funds' Performance

In this appendix, we show that monetary policy positively affect the performance of loan funds. Namely, we estimate regression (1) using fund net returns (instead of flows) as dependent variables. Results are in Table 16. For a one-unit drop in the forward guidance surprise, loan funds' net returns decrease by 1.1 pp (p-value < 0.01) relative to those of high-yield bond funds; this effect is statistically robust and quantitatively similar across specifications (e.g., when allowing for a differential effect of risk aversion and market uncertainty across fund types).

This evidence supports our conjecture that monetary policy shocks positively impact loan funds' performance through an interest-rate channel due to the floating-rate feature of leveraged loans, suggesting that the positive effect on income stream dominates the negative effect on asset valuation.

	Net Return$_{it}$			
	(1)	(2)	(3)	(4)
Loan$_{it-1}$ × FG Factor$_t$	1.078***	1.101***	1.147***	1.198***
	(0.089)	(0.090)	(0.088)	(0.087)
Loan$_{it-1}$ × VIX$_t$			0.086***	0.129***
			(0.012)	(0.022)
Flow$_{it-1}$	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
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	0.811	0.812	0.811	0.812
Observations	111311	111311	111311	111311

Table 16: Effect of monetary policy shocks on fund performance (net returns). 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. The dependent variable, Net Return, is the net return of the share class in that month in percent. Loan is a dummy variable equal to one for loan-fund share classes. FG Factor is equal to the forward guidance surprise from Swanson (2021) in that month (see text for details). 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 class' total net assets (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. 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. 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.

Appendix B Using All Corporate Bond Funds as Control Group

In this appendix, we report the main results of the paper's regressions, as presented in subsections 4.1–4.3, Tables 2–4, when using all corporate bond funds as control group. The results, already commented in the main body of the paper, show extreme robustness of the main coefficients of interests.

	$Flow_{it}$			
	(1)	(2)	(3)	(4)
$Loan_{it-1} \times$ FG $Factor_t$	1.128***	1.014***	1.034***	0.966***
	(0.124)	(0.118)	(0.126)	(0.123)
$Loan_{it-1} \times VIX_t$			-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 $\times$ 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 17: 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. The dependent variable, 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 $_t > 0$	-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 18: 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. The dependent variable, 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)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LIBOR	LIBOR	LIBOR	LIBOR	LIBOR	LIBOR	LIBOR	LIBOR
	$< 1.5\%$	$> 1.5\%$	$< 1.5\%$	$> 1.5\%$	$< 1.5\%$	$> 1.5\%$	$< 1.5\%$	$> 1.5\%$
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 19: 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). The dependent variable, 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.

Appendix C Monetary Policy and Loan Refinancing

We argued in Section (2) that the improvement in borrowers' financial conditions that typically occurs during expansionary periods makes it easier for riskier 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 observe 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:

$$\begin{aligned} \text{Refi}_{it} = &\beta \, \text{FG Surprise}_{t-1} + \gamma \, \text{LoanSpread}_i \\ &+ \theta \, \text{FG Surprise}_{t-1} \times \text{LoanSpread}_i + \phi \, \text{Controls}_{it} + \psi_{b(i)} + \varepsilon_{it} \end{aligned} \tag{4}$$

where Refi_{it} is a dummy variable equal to one if outstanding loan i is refinanced in quarter t and zero otherwise. Because Dealscan captures information only at the time of the loan origination, it does not identify which loans are refinanced and when they are refinanced; it only contains information on the loan terms at origination.[21] To identify refinancings, we follow each borrower over time and classify an outstanding 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 outstanding loan reaches its maturity date. When that happens, we assume the borrower refinanced the outstanding loan with the new loan.[22]

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

[21]Dealscan contains a variable that indicates whether a given loan is to refinance existing debt, but it does not identify the loan being refinanced. We do not rely on this information because the terms of the loan being refinance are crucial for our exercise.

[22]As a robustness check, we investigate whether the loans we identify as refinancings are classified as such in Dealscan and find that to be the case for virtually all of them.

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 quarter 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, includes year dummy variables 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 a set of features of outstanding loans, including 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 4 are reported in Table 20. As we conjectured, following positive surprises in forward guidance, riskier borrowers are relatively more 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 20.

For robustness, we rerun regression 4 restricting our classification of refinancing to instances when the outstanding loan is followed by a new loan with a lower spread.[24] We continue to find that riskier borrowers are relatively more likely to refinance their loans following positive forward guidance

[23] Ideally, one would run this exercise on the set of borrowers whose loans are held by the loan funds in our sample. 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.

[24] 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).

surprises. Our sample includes both term loans and credit lines, but loan funds invest mostly in term loans. As an additional robustness test, we re-estimate regression 4 including only term loans. We obtain similar results.

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.

	(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 20: 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.

Appendix D The Flow-Performance Relationship in Loan Funds

In this appendix, we show that investor flows in loan funds respond to fund performance. Moreover, we also show that the flow-performance relationship of loan funds is concave and more so than that of bond funds. This evidence suggests that loan funds are exposed to run risk and more so than bond funds, which is consistent with the high degree of illiquidity in leveraged loans documented in Elkamhi and Nozawa (2022).

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:

$$\begin{aligned}\text{Flow}_{it} = &\beta_0 \,\text{Return}_{it-1} + \gamma_0 \,\mathbf{1}\left(\text{Return}_{it-1} < 0\right) + \delta_0 \,\mathbf{1}\left(\text{Return}_{it-1} < 0\right) \times \text{Return}_{it-1} + \\ &+ \beta_1 \,\text{Loan}_{it-1} \times \text{Return}_{it-1} + \gamma_1 \,\text{Loan}_{it-1} \times \mathbf{1}\left(\text{Return}_{it-1} < 0\right) + \\ &+ \delta_1 \,\text{Loan}_{it-1} \times \mathbf{1}\left(\text{Return}_{it-1} < 0\right) \times \text{Return}_{it-1} + \\ &+ \theta \,\text{Flow}_{it-1} + \phi \,\text{Controls}_{it-1} + \alpha_i + \mu_t + \varepsilon_{it}, \end{aligned} \tag{5}$$

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. $\mathbf{1}\left(\text{Return} < 0\right)$ is a dummy variable for negative returns, and Loan is a dummy variable for share classes belonging to loan funds.[25] Controls is a vector of 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 (5) 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

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

bond funds and $(\beta_0 + \beta_1) + (\delta_0 + \delta_1)$ for loan funds.[26] 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 (5) 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 (5) 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 (5) using all corporate bond funds as control group. All results are reported in Table 21. Standard errors are clustered at the share-class level to control for serial correlation.

We start by estimating a simplified version of equation (5) that only includes linear return terms; that is, we drop the terms proportional to $\mathbf{1}\,(\text{Return} < 0)$ from equation (5). 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.[27]

For high-yield bond funds, a one-standard-deviation increase in net returns leads to a statistically significant increase in monthly flows of 0.4 percentage points (pp) with p-value $= 0.049$.[28] The effect for loan funds is even stronger: their monthly flows increase by an additional 1.5 pp (p-value < 0.01). This effect is economically meaningful because it represents more than 10% of the standard deviation

[26] Regression (5) 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.

[27] 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.

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

of monthly flows in our sample.[29]

In Column (2), we re-estimate the same regression but this time 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 of 0.4 pp (p-value < 0.01) and additional inflows in loan funds of 1.1 pp (p-value < 0.01).

We now turn to quantifying the differential response of loan-fund flows to good vs. bad performance to test our Hypothesis 1. Columns (3) and (4) of Table 21 show the results of regression (5) 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 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 we compare loan funds only to high-yield bond funds ($\delta_1 = 0.099$, p-value < 0.01) and when we include 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 suggest that loan funds exhibit greater flow sensitivity to performance and are

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

more exposed to run risk, which is consistent with leveraged loans being illiquid and even more so than high-yield bonds.

	$Flow_{it}$			
	(1)	(2)	(3)	(4)
$Return_{it-1}$	0.024**	0.024***	0.019***	0.011***
	(0.012)	(0.003)	(0.007)	(0.004)
$Loan_{it-1} \times Return_{it-1}$	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)
$Loan_{it-1} \times I(Return < 0)_{it-1}$			-1.830***	-1.924***
			(0.481)	(0.517)
$I(Return < 0)_{it-1} \times Return_{it-1}$			0.002	0.036***
			(0.022)	(0.009)
$Loan_{it-1} \times I(Return < 0)_{it-1} \times Return_{it-1}$			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 21: 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. The dependent variable, 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.