Leveraged Loans and the Transmission of Monetary Policy

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Abstract

Leveraged loans are borne out of an *originate-to-distribute* lending model that attracts non-bank investors. We argue that differences between banks and non-banks—primarily, the duration of their liabilities—fundamentally alter the transmission of monetary policy through lending. Our analysis shows that leveraged loan spreads are shielded from federal funds rate shocks, especially for tranches held by non-banks. The pass-through pattern is strongest in Term B loans—typically held by nonbank investors—and muted in Term A facilities and revolvers, consistent with the mechanism operating through patient nonbank investors. These impacts are concentrated in loans to financially healthy borrowers (preferred by non-bank investors during tightenings), refuting a "zombie lending" channel in which risky borrowers receive better terms due to forbearance. The effects we identify on spreads are accompanied by expansions in leveraged credit volume and loan maturities, creating aggregate impediments to monetary policy transmission.

KEYWORDS: Leveraged lending, monetary policy, originate-to-distribute model, non-banks
JEL CLASSIFICATION: E44, E52, G21, G23, G32

1 Introduction

The leveraged loan market in the U.S. reached over $3 trillion as of mid-2025. This represents an almost fourfold increase from $750 billion in 2013; it now accounts for roughly half of the syndicated loan market.[1] The emergence of leveraged loans as a prominent new asset class in the wake of the Global Financial Crisis (GFC) parallels the rising popularity of banks' "originate-to-distribute" model of corporate lending (Sufi 2007; Bord and Santos 2012). By originating leveraged loans and selling large holdings to institutional investors—such as loan mutual funds and collateralized loan obligations (CLOs)—banks collect fees while minimizing balance sheet exposure. Traditionally, changes in rates on loans held on banks' balance sheets have been a significant channel of monetary policy transmission (Kashyap, Stein, and Wilcox 1993; Kashyap and Stein 2000; Campello 2002). The rising popularity of leveraged lending—characterized by higher borrower risk, floating rate structure, and the involvement of non-bank investors—raises new questions about the effectiveness of monetary policy transmission through corporate lending. This paper uses new administrative data to address this issue, bringing to bear unique features of leveraged loans and their institutional context.

Leveraged loans are increasingly syndicated and held by non-bank institutions under a structure in which banks act as on-the-spot deal arrangers rather than long-term relationship lenders. Our paper shows how this originate-to-distribute model fundamentally alters the issue of maturity mismatch in bank lending—a key driver of monetary policy transmission. In short, because conventional, non-leveraged loans are mostly held on banks' balance sheets and funded by short-term deposits, banks are forced to raise loan rates to fund the higher rate required on fluid deposits under tight monetary policy regimes. Leveraged loans, in contrast, are often held by a diverse mixture of non-bank financial institutions, whose long-term liabilities come from "patient investors" like insurance companies, sovereign wealth funds, pension funds, and exchange traded funds (ETFs) (see DeMarco, Liu, and Schmidt-Eisenlohr 2020). These investors are generally not liquidity-constrained, are not subject to runs (liabilities are often "locked-in" in a closed-end arrangement), and are not subject to "stress" or "mark-to-market" tests; they seek to extract higher rates of return and find value in the longer run from the deals they strike. These structural differences make them less responsive to short-term rate increases. We argue that this segmentation between conventional and leveraged loan investors makes monetary policy transmission weaker in the leveraged loan market.

Loan–deposit maturity mismatch plays a key role in the transmission of monetary policy shocks through the banking system (see, e.g., Drechsler, Savov, and Schnabl 2017). To wit, whenever the federal funds rate increases, short-term deposits flow out of banks, causing them to cut lending and charge higher spreads, thereby reducing the amount of credit in the economy. The emergence of leveraged loans upends this story in several ways. First, in contrast to traditional bank loans, leveraged loans are not largely held on a bank's balance sheet after origination. In the originate-to-distribute model, banks "build a book" and seek out investors to purchase tranches of the loan. They perform demand discovery (Bruche, Malherbe, and Meisenzahl 2020) and collect an origination fee for solving coordi-

1. These statistics are from the Shared National Credit report. For more details, see Figure 3.

nation problems. They only hold a small slice of the loan on their balance sheets as a means to enforce covenants and provide assurances to investors (Berlin, Nini, and Yu 2020). Another critical difference is the composition of leveraged loan investors. In contrast to traditional syndicated loans—where other banks take significant shares—the lion's share of leveraged loan tranches are held by non-bank institutional ("alpha-seeking") investors. The majority of these non-banks are closed-end; that is, their investors cannot withdraw funds at will. Because the liabilities that fund leveraged loans are of a longer maturity than those that fund bank loans, they are not susceptible to the same deposit outflows that constrain bank lending in response to interest rate shocks.

We use a supervisory dataset from the Federal Reserve's Y-14Q H.1 schedule to identify the key features associated with banks' involvement in leveraged lending and how this lending practice affects monetary policy transmission. Important for our study, the Y-14Q data cover *both* leveraged and conventional, non-leveraged loans—simultaneously granted to the *same* firm—by major banks in the U.S., providing comprehensive information on lending terms. In our tests, we assess the impact of federal funds rate shocks on the interest rate spreads of newly originated leveraged loans compared to traditional loans. To address the endogeneity of monetary policy changes, we use the high-frequency shocks of Swanson (2021), who identifies exogenous, unanticipated changes in monetary policy by observing shifts in federal funds rate futures prices in the 30-minute window surrounding FOMC announcements. We combine these shocks with the Y-14Q and saturate our empirical models with numerous fixed effects, capturing the dynamics of underlying factors that may affect loan pricing terms, such as industry–time fixed effects, loan type fixed effects, (lead) bank–time fixed effects, as well as borrower firm–time fixed effects. Thus, we effectively compare observably similar leveraged and non-leveraged loans of the same type and risk level, originated by the same lead bank, to borrowers in the same sector at a given point in time. The richness of our data allows for strong identification using the Khwaja and Mian (2008) specification of firm–time fixed effects to account for time-varying borrower characteristics, including its credit risk or credit demand, which may attenuate the effects of monetary policy on loan pricing. That is, we effectively compare at a specific point in time observably similar loans to the *same* borrower, differing only in the nature of the loan structure (leveraged *vs.* non-leveraged loans) offered by their banks. Our tests yield striking results: while both loan types experience adjustments following policy shocks, leveraged loans exhibit *muted responses* across dimensions such as rate spreads, facility sizes, and tenors.

We conduct analyses to rule out the possibility that the muted reaction of leveraged loans to monetary policy shocks could be driven by selection bias; that is, a smaller number of higher quality leveraged loans might be originated after contractionary monetary policy shocks and thus receive better terms (e.g., lower rates) on average. We find that the volume of leveraged loans *increases* relative to non-leveraged loans when monetary policy tightens; it does so across the spectrum of borrower quality, confirming that our results are not driven by banks' shifting their lending towards a smaller number of leveraged loan borrowers (old or new).

Our facility-level data further allow us to identify the mechanism through which monetary policy tightening differentially affects leveraged loans by decomposing them into tranches held by banks versus non-banks. In most leveraged loan deals, originating banks retain a credit line tranche in order to conduct monitoring and enforce covenants. Because these tranches are held on the bank's balance sheet, they are subject to the same deposit outflow pressures as traditional bank loans. Similar to these credit lines, "Term Loan As" are amortizing term loans sold to other banks. We expect these pro rata tranches (held on banks' balance sheets) to experience higher spreads due to banks' pressure to raise deposit rates to retain short-term liability funding. In contrast, "Term Loan Bs" are held by non-bank institutions or vehicles that are funded by patient investors. We conjecture that monetary policy transmission is weakest in leveraged loans held by investors with long-term liabilities, reflected by Term Loan Bs. The results of our extensive tests confirm that leveraged loan tranches marketed to institutional investors show a weaker policy rate pass-through than those held by banks.

We next seek to understand how *borrowers' characteristics* influence the interest rate sensitivities we observe. This is important to help allay concerns about endogeneity biases affecting our base tests. We do so by looking at variation in policy transmission based on borrowers' *ex-ante* financial health. Note that a contractionary monetary policy raises firms' credit risk. By extending a lifeline to troubled borrowers through loans with lower rates, banks may avoid or postpone balance sheet losses in difficult times—"gambling for resurrection" on bad credits (Bruche and Llobet 2014). Banks are also said to extend credit to bad creditors as a way to preserve their relationships and the information-value of their credit facilities (Hu and Varas 2021). Accordingly, one may argue that some of the weakened monetary transmission could be a result of "zombie lending."[2] If this mechanism were true, one would expect a more pronounced weakening of monetary policy transmission through leveraged loans to borrowers in the worst financial health. Well-diversified non-banks, in contrast, have less "skin in the game" and are freer to focus on investing in borrowers with solid fundamentals, rather than on minimizing losses on existing balance-sheet exposures. Moreover, they are also more able to weather short-term losses without facing stringent regulatory constraints or liability outflows. Non-banks thus have fewer incentives to "gamble for resurrection" and may favor high-quality leveraged borrowers.

We run several tests to determine which of the above two forces dominates new leveraged originations in the aftermath of policy shocks. We find that spreads for low-quality leveraged loan borrowers are similar to non-leveraged loans, while high-quality leveraged borrowers receive significantly *lower spreads*. In short, our results show that reduced monetary policy transmission is concentrated in leveraged loans to higher-quality borrowers, in line with our non-bank quality hypothesis and contrary to a "zombie lending" channel. Notably, we do find evidence of "zombie lending"—but only for non-leveraged borrowers, with banks failing to raise rates on poor-quality non-leveraged credits after monetary policy shocks. Going a step further, we investigate the role of bank–firm relationships, testing whether prior lending connections between borrowers and banks affect rate pass-through. We find that leveraged loans without prior bank–firm relationships exhibit weaker responses to monetary policy, indicating that relationship lending is not the main driver influencing the weakened monetary policy tightening on leveraged loans (Office of the Comptroller of the Currency 2013).

2. Caballero, Hoshi, and Kashyap (2008) and Aretz, Campello, Kankanhalli, and Schneider (2024) have shown that zombie lending practices hurt profits of healthy firms and lower productivity in affected industries.

We then turn our attention to *banks' characteristics* and study if the effects of monetary policy shocks on leveraged loans are attenuated or accentuated depending on the *ex-ante* profiles of the credit providers. We do so by examining the interest rates applied to loans provided by banks with varying capitalization bases and portfolio credit quality. One plausible mechanism for this pattern is the fee-dependence of weaker banks: because originating and underwriting leveraged loans generates substantial non-interest (arranging/underwriting) fees, banks with weaker capital base or otherwise "weaker" may have stronger incentives to protect fee streams by cushioning borrowers from rising secondary-market spreads following monetary policy tightenings. This behavior is consistent with evidence that banks acting as arrangers retain pipeline exposure and earn sizable fees from leveraged-loan syndications, and with literature showing banks can dampen the transmission of debt-market shocks to their borrowers.

Finally, we note that commercial loans frequently undergo renegotiations (Roberts and Sufi 2009; Bradley and Roberts 2015). Arguably, this could effectively serve as an alternate channel for transmitting monetary policy. To address this point, we test whether weakened monetary policy transmission in leveraged loans occurs in the context of renegotiations. We find that renegotiation is not a channel for transmitting monetary policy shocks to leveraged loans.

Our paper contributes to three strands of literature. First, it demonstrates the important role played by the originate-to-distribute model in the transmission of monetary policy. In doing so, it delineates the growing involvement of non-banks as loan syndicate members and identifies policy-consequential features of leveraged loans.[3] It also complements the literature on the impact of monetary policy shocks on non-bank lending, which shows that monetary tightenings increase the number of non-bank participants (Chen, Ren, and Zha 2018; Drechsler, Savov, and Schnabl 2022), increase their supply of credit (Elliott, Meisenzahl, Peydró, and Turner 2022; Emin, James, Li, and Lu 2023), create non-bank loan fund inflows (Cetorelli, La Spada, and Santos 2023), and move deposits from banks to non-banks (Xiao 2020). Finally, the macroeconomic and macroprudential significance of our findings is highlighted by the literature on the decades-long decline in bank balance sheet lending (Buchak, Matvos, Piskorski, and Seru 2024; Hanson, Ivashina, Nicolae, Stein, Sunderam, and Tarullo 2024), which shows that increases in bank regulation drive the migration of lending to non-banks (Irani, Iyer, Meisenzahl, and Peydró 2021), particularly in the case of leveraged lending regulation (Kim, Plosser, and Santos 2018).

Second, we identify a novel *maturity mismatch channel* of monetary policy transmission, wherein differences in investors' liability maturities create heterogeneous responses to monetary policy shocks. This result builds on the classic literature examining monetary policy transmission through credit markets. Contrary to the classical hypothesis that credit markets only reflect—not impact or amplify—changes in the real economy during downturns, it has been repeatedly shown that aggregate bank credit contracts in response to monetary policy (Bernanke and Blinder 1988, 1992; Kashyap, Stein, and Wilcox 1993). Several mechanisms have been proposed to justify this observation, including the *balance-sheet channel*, in which tight credit conditions hurt borrowers through heightened interest

3. Prior regulatory work pointed to the rise of the originate-to-distribute model in the early 2000s and the emergence of non-banks, such as CLOs, in the lending ecosystem (Bord and Santos 2012).

expenses, curtailing banks' willingness to lend (Bernanke and Gertler 1995); the *financial accelerator* theory, in which credit markets amplify changes to the real economy and create shocks of their own (Bernanke, Gertler, and Gilchrist 1999); *liquidity constraints* that cause small banks to reduce lending (Kashyap and Stein 2000); and the *risk-taking channel*, in which accommodative monetary policy causes poorly capitalized firms to issue larger and riskier loans. Perhaps closest to our paper is the *deposits channel* of Drechsler, Savov, and Schnabl (2017), who show that aggregate credit changes can be explained through market-power-induced differences in the spreads that banks charge on deposits in response to monetary policy. Indeed, since non-banks have long-term liabilities that shield them from the fluid deposit outflow that drives the deposits channel, it is their lack of maturity mismatch that produces the weakened monetary transmission in our results.

Finally, we show how non-bank investor pressure mitigates the impacts of zombie and relationship lending on leveraged loan terms. Zombie lending is the practice of continually extending credit to insolvent borrowers. Banks with many bad loans during a downturn "gamble for resurrection" by renewing zombie credits and waiting—often in vain—for borrowers to recover.[4] Related to our paper, early theoretical work by Hachem (2011) suggests that relationship lending dampens monetary policy transmission, since relationships create switching costs and competing lenders must offer lower rates to attract new borrowers. In the context of leveraged loan markets, we find that new leveraged borrowers receive significantly better loan terms than relationship borrowers after contractionary monetary shocks.

Our paper is organized as follows. Section 2 describes the institutional context of leveraged lending and introduces our data sources. In Section 3, we discuss empirical facts about the leveraged lending market and characterize the borrowers and banks that participate within it. We describe our main results in Section 4, testing the impact of monetary policy shocks on leveraged loan terms. Section 5 investigates the mechanisms behind these results. Section 6 concludes.

2 Institutional Background and Data

2.1 Institutional Setting

The global leveraged lending market has grown consistently to become a fully-fledged asset class and an indispensable component of the corporate finance, M&A, and leveraged buyout landscapes. During the last decade, the total U.S. leveraged loan market has more than tripled in size, reaching over $2.9 trillion as of 2022. Leveraged loans are typically loans to riskier borrowers in which some portion is held by non-bank institutional investors.[5] To highlight the major differences between the traditional and leveraged loans, we illustrate their lending ecosystems in Figure 1. On the left side, we depict a traditional

4. Indeed, Acharya, Lenzu, and Wang (2021) find that zombie creation is a byproduct of a monetary policy that is overly focused on preventing short-term recessions and that grants banks excessive forbearance.

5. There is no universal definition of leveraged loans among academics, regulators, and market investors. S&P Global defines them as syndicated loans with either a spread of at least 125 basis points or a sub-investment grade rating (Bruche, Malherbe, and Meisenzahl 2020). U.S. banking regulators (the Federal Reserve, the OCC, and the FDIC) state that leveraged loans are often (1) used for M&A or capital distributions, (2) to a firm with a debt–EBITDA ratio exceeding 3 or 4, depending on the industry, (3) to a firm with a high debt–net-worth ratio, or (4) to a firm whose post-financing leverage is significantly above industry norms (Board of Governors of the Federal Reserve System 2013). We are agnostic about the specific definition, instead relying

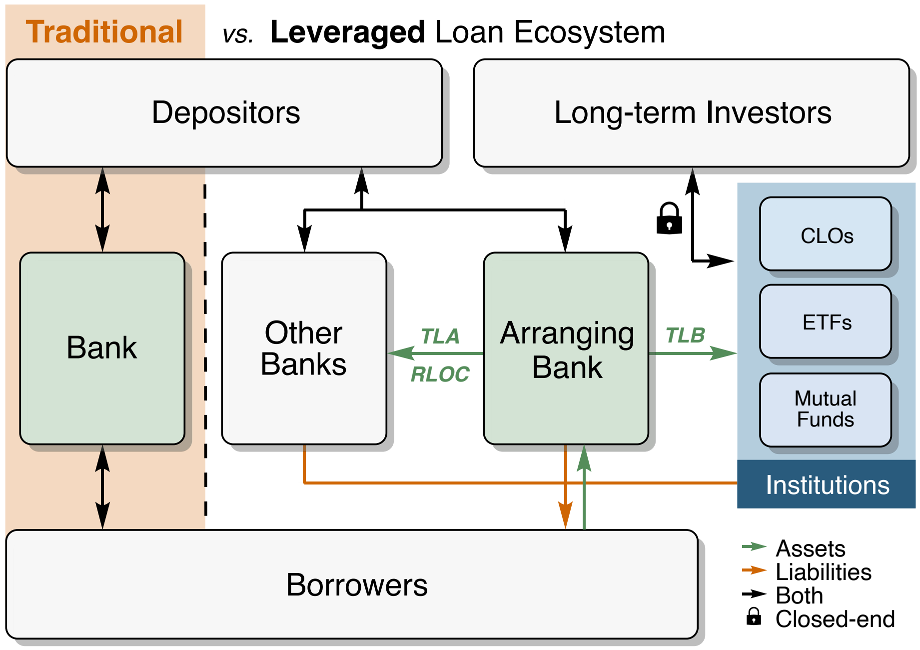

Figure 1. Ecosystems in Bank Lending

bank loan—a simple arrangement between a bank, a borrower, and depositors, in which the bank holds the loan on its balance sheet to maturity. On the other side, we depict leveraged loans. Many leveraged loans are syndicated during origination, a process by which an *arranging bank* assembles a group of investors—the *syndicate*—each of whom buys pieces of the loan and thus claims on future interest payments. In the figure, these are the "other banks." The arranger earns a fee for providing this service, and usually retains a small portion of the loan to facilitate covenant monitoring (Berlin, Nini, and Yu 2020).[6] This *originate-to-distribute* model differs from the traditional *originate-to-hold* model of bank lending, in which a bank directly lends to a firm and holds the loan on their balance sheet to maturity.

Leveraged loans often include non-bank investors within the syndicate, while traditional investment-grade syndicated loans are usually only funded by other banks. This unique feature of leveraged loans is crucial for our analysis, since it generates variation in liability maturity mismatch between loan funders. Non-bank investors in leveraged loans include collateralized loan obligations (CLOs), closed-end loan mutual funds, and exchange traded funds (ETFs). Due to U.S. tax laws, their participation in the primary market takes the form of "primary assignments," an arrangement in which they commit to purchasing leveraged loan tranches from arranging banks shortly after deals close (Blickle, Fleckenstein, Hillenbrand, and Saunders 2022). This creates a window in which non-bank-destined tranches are held on arranging banks' balance sheets—a fact that is crucial for our later analysis, since otherwise these tranches would not appear in our data. In addition to participating in the primary market, institutional investors may trade leveraged loans on a secondary market, much like securities. Indeed, Prilmeier and Stulz (2019)

on banks' internal determination of whether a loan is leveraged. This unique feature of our data allows us to provide a more accurate picture of market participants' perspective on leveraged lending than other ad hoc definitions used in the literature.

6. Bruche, Malherbe, and Meisenzahl (2020) report that the average lead arranger fee is about 2% of the loan commitment.

show that leveraged loans are attractive to issuers and investors in part because they offer security-like properties without being subject to the stringent regulations that security designation entails.

Leveraged loans are often composed of multiple facilities, including revolving lines of credit, Term Loan As, and Term Loan Bs. These are created by the arranging bank and are depicted in Figure 1 as the green lines extending from the arranger to the participants. Revolvers are standing facilities that firms borrow from and repay on a regular basis, and are usually held by the arranging bank or other banks in the syndicate. Term Loan As are amortizing term loans that are syndicated to other banks. These two types of bank-held facilities are known as *pro rata* debt, since bank participants historically invested in the revolver and Term Loan A in equal proportions. In contrast, Term Loan Bs are non-amortizing term loans that are marketed to non-bank investors. They are usually lower in the capital structure than pro rata loans, *cov-lite* (carry fewer covenants), and are priced differently than pro rata loans, since banks often consider other fee-based revenue sources (e.g., cash and pension fund management) when they invest (S&P Global 2020). These Term Loan Bs are often known as *institutional loans*, since they are held by institutional investors.

2.2 Leveraged Lending Data

We now present our data sources and characterize our sample.[7] We obtain corporate loans and borrower characteristics from Schedule H.1 of the Federal Reserve's Y-14Q data collection, bank information from the Federal Reserve's Y-9C dataset, and syndicate participant data from the Shared National Credit (SNC) program. The Y-14Q data were first collected in 2011 to support the Dodd–Frank Act's supervisory stress tests and the Federal Reserve's Comprehensive Capital Analysis and Review program. The panel consists of quarterly observations of commercial loans of at least $1 million held by U.S.-operating bank holding companies with more than $100 billion in total consolidated assets.[8] These loans make up nearly 70% of the total commercial and industrial lending by U.S. bank holding companies (Bidder, Krainer, and Shapiro 2021). We restrict our sample to newly-originated loans to focus on the impact of monetary policy on loan terms. Our sample begins in 2016 and ends in 2023, since banks were not required to report whether a loan was leveraged until 2016 and our data on monetary policy ends in March 2023.

Panel A of Table 1 provides summary statistics for our sample of Y-14Q loans.[9] We have 208,066 loans over the period from 2016:Q4 to 2023:Q1 and 140,281 of these loans report an interest rate.[10] The average loan has a commitment value of $29 million, a spread of 222 basis points, and a tenor of 43 months. When banks report loans for the Y-14Q, they are required to submit their internal determination of whether the loan is leveraged. As such, we also report means for the 46,965 leveraged and 161,101 non-leveraged loans in the sample. Leveraged loans tend to be larger than non-leveraged loans ($47

7. For detailed information about data cleaning and variable construction, please refer to Appendix A.

8. Before December 2019, banks with total consolidated assets between $50 and $100 billion were also required to report.

9. Note that, technically, the Y-14Q provides data at the *facility* level, and not the *deal* level. For example, a single leveraged loan deal might include several facilities, including revolvers, Term Loan As, and Term Loan Bs. Each facility is identified as a different observation in the Y-14Q, with no unique identifier connecting them. Therefore, in this paper, we use the words "loan" and "facility" interchangeably.

10. As described in Appendix A.3, we construct each loan's spread by comparing its reported interest rate to that of a comparable-maturity Treasury, obtained from the Federal Reserve's H.15 series.

vs. $24 million), have a longer maturity (49 *vs.* 41 months), and have a greater spread (256 *vs.* 212 basis points). They are also more often sub-investment grade (72% *vs.* 56%), syndicated (65% *vs.* 28%), and senior-lien (99% *vs.* 97%).[11] Finally, leveraged loans are renegotiated more often, with 2.6% renegotiated over the loan lifetime compared to 1.0% for non-leveraged loans.

TABLE 1 ABOUT HERE.

The Y-14Q also contains information about the borrower of each loan, which we later exploit in our use of the Khwaja and Mian (2008) method to disentangle firm demand effects on the impact of monetary policy on leveraged loans. Importantly, these data include the financial information of private borrowers, which is unavailable in most datasets used in the literature. To track borrowing firms across loans from different banks, we construct unique firm identifiers using Taxpayer Identification Numbers and cleaned company names, described in Appendix A.1. We also clean reported firm financials by applying consistency filters and trimming financial variables at the 1st and 99th percentiles, described in Appendix A.2. Panel B of Table 1 reports summary statistics for the 112,197 firm-quarters in our cleaned sample, representing 58,424 unique firms.[12] The average firm size is $5.6 billion, with a median of $80 million. Thus, our sample covers a broad range of firms, including many small and medium-sized enterprises (SMEs). The average debt–EBITDA ratio is 2.8, the cash–assets ratio is 10%, the tangibility is 87%, and the sales–assets ratio is 180%. The data also include information on the location, listing status, and industry of the borrower.[13]

To obtain information about bank characteristics, we merge the Y-14Q with the Federal Reserve's Y-9C dataset using each bank's RSSD identifier. The Y-9C consists of quarterly financial information for U.S.-operating bank holding companies with at least $3 billion in consolidated assets. Panel C of Table 1 reports statistics for the 785 bank-quarters in our sample. On average, the size is $581 billion, the capitalization is 11%, and the percentage of non-performing loans is 0.8%. These statistics are consistent with the fact that the Y-14Q data collection covers the largest U.S.-operating banks (29–35 of them, depending on the quarter), which are the major originating players in the leveraged lending market.

One limitation of the Y-14Q is that it lacks detailed information about the non-bank participants in syndicated and leveraged loans. Accordingly, we supplement our analysis with data from the Shared National Credit (SNC) program. These data have been collected since 1977 and cover syndicated loans of at least $100 million originated by federally-supervised institutions. For each loan, information is available on every participant, including hedge funds, mutual funds, and collateralized loan obligations (CLOs).[14] However, the sample does not contain non-syndicated loans, hence we cannot use it for our primary comparison between leveraged and traditional loans. Additionally, the SNC data only cover the

11. Sub-investment grade is defined as a bank internal risk rating of BB or worse. The Federal Reserve uses concordance tables provided by the banks to map the raw private ratings to a standardized rating scale (AAA, AA, A, BBB, BB, B, etc.) comparable across banks. Importantly, while these ratings use the S&P-style rating scale, they are the bank's private ratings.

12. We aggregate the statistics to this level since each firm's financials change over the sample period. This may bias our statistics towards large firms, since they may borrow more often. Note that we cannot provide a subsample split because firms often borrow using leveraged and non-leveraged loans simultaneously.

13. Each firm's 6-digit NAICS code is reported, which we map to the OCC's 22-industry classification.

14. The SNC directly reports whether a participant is a bank or non-bank, but not their specific sub-type. We define CLOs by whether the participant name includes the word "CLO" or a similar variation.

largest syndicated loans, so it is not as representative of the U.S. lending landscape as the Y-14Q. Given the significant differences between the sample covered in Y-14 and SNC and the different identifiers used, we run tests with these separate samples.

2.3 Monetary Policy Shocks

Since we study the impact of monetary policy on leveraged loan terms, we must pay careful attention to the high degree of endogeneity within traditional policy measures like changes in the federal funds rate. Indeed, if we used the federal funds rate directly, anticipation of FOMC decisions would compromise our identification strategy. To address these concerns, we use *unexpected* changes in monetary policy within our analysis. If a rate decision is unanticipated, we are able to identify its impact in the period immediately following.

We use the monetary policy shock measures of Swanson (2021), which we obtained from the author through March 2023. His method uses high-frequency changes in federal funds futures prices in the 30-minute window surrounding FOMC announcements to isolate three orthogonal monetary policy shock factors: those to the federal funds rate, to forward guidance, and to large-scale asset purchases. We are most interested in changes to short-term rates, since these are used as the reference for floating-rate loans, so we use the federal funds factor as our primary measure of monetary policy. We merge these data with the Y-14Q by associating each new origination with the shock values that correspond with the most recent FOMC release relative to the origination date. We normalize each shock by its standard deviation over our period of observations.

We plot the series of federal funds shocks in Figure 2. To add intuition, we annotate the plot with four cases of unexpected shocks: (1) In June 2019, market participants expected that the FOMC would not immediately cut rates, but would do so in July or September 2019. The FOMC provided a contractionary shock to markets when they signaled that rates would not be cut until 2020, as the headline indicates. (2) In March 2020, the FOMC announced two emergency rate cuts in response to the coronavirus pandemic. These expansionary shocks are the two largest in our sample. (3) During the Fed's period of aggressive hiking in September 2022, the market largely expected a 75 basis point hike, but also priced-in a 15% probability of 100 basis points instead. When the FOMC announced only the smaller hike, they delivered an expansionary shock. (4) Finally, after the failure of Silicon Valley Bank (SVB) in March 2023, market participants speculated that turmoil in the banking sector might cause the FOMC to pause their series of rate increases. Instead, the Fed went ahead with a 25 basis point hike, creating a contractionary shock.

3 Empirical Facts

This section provides a primer on leveraged loans and describe broad features of the market. We first describe market dynamics, including the rapid growth of leveraged loan issuance and the differences in the market between the beginning and end of our sample. We then discuss the risk profile of leveraged loans, comparing them to conventional bank loans. Finally, we analyze the characteristics of the firms that borrow using leveraged loans and the banks that originate them.

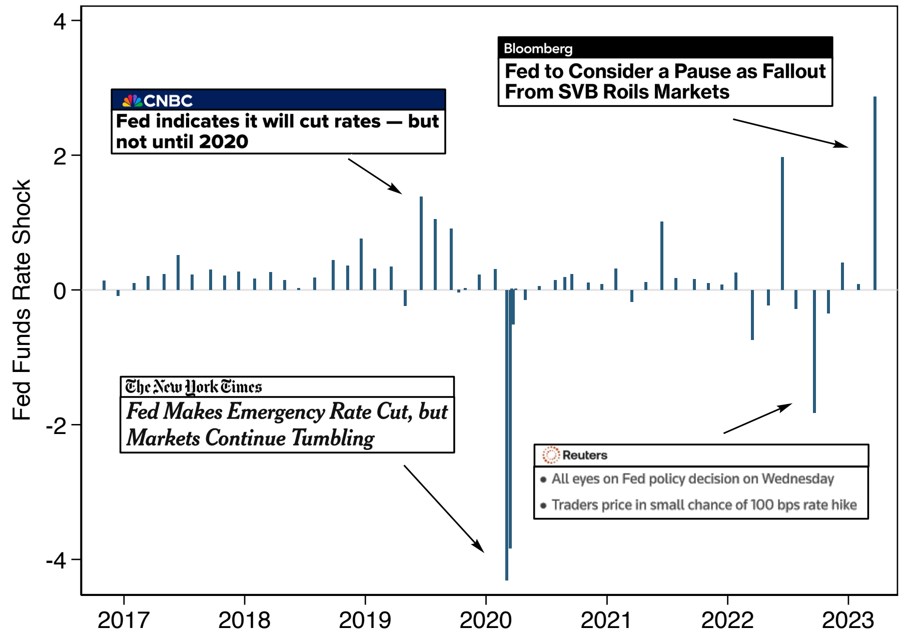

Figure 2. Swanson (2021) Shocks to the Federal Funds Rate

3.1 Market Growth

The leveraged lending market experienced rapid growth in the wake of the Global Financial Crisis. Figure 3 uses data from the Shared National Credit (SNC) program to illustrate the magnitude of this growth. In 2013, leveraged loans made up less than $1 trillion of the $3.5 trillion syndicated lending market. By late 2022, the market had doubled in size, with more than $2.9 trillion in outstanding commitments. It had also grown from roughly a quarter of the overall syndicated market to nearly half. This growth is driven in part by the increasing involvement of private, non-bank lenders in bank credit provision. Over the entire sample of originations, the share of credit value held by non-banks was 33.1% for leveraged loans, but only 8.7% for non-leveraged loans.

3.2 Risk Profile

As discussed above, leveraged loans are defined in part by being riskier than non-leveraged loans. It is important that we illustrate this difference. To do so, we plot a histogram of ratings for each loan type in our sample in Figure 4. These are from our Y-14Q sample and use banks' internal risk rating for each loan, mapped to the S&P's AAA to D scale. Non-leveraged loans are shifted towards the left-hand side of the chart, with substantial shares in investment-grade ratings (AAA through BBB). About 10% of the non-leveraged loans are rated A, 30% are BBB, over 40% are BB, and 10% are B. On the other hand, leveraged loan ratings are shifted to the right-hand side, with more non-investment grade ratings (BB and lower). Under 5% are A, 20% are BBB, almost 50% are BB, and over 20% are B—more than twice

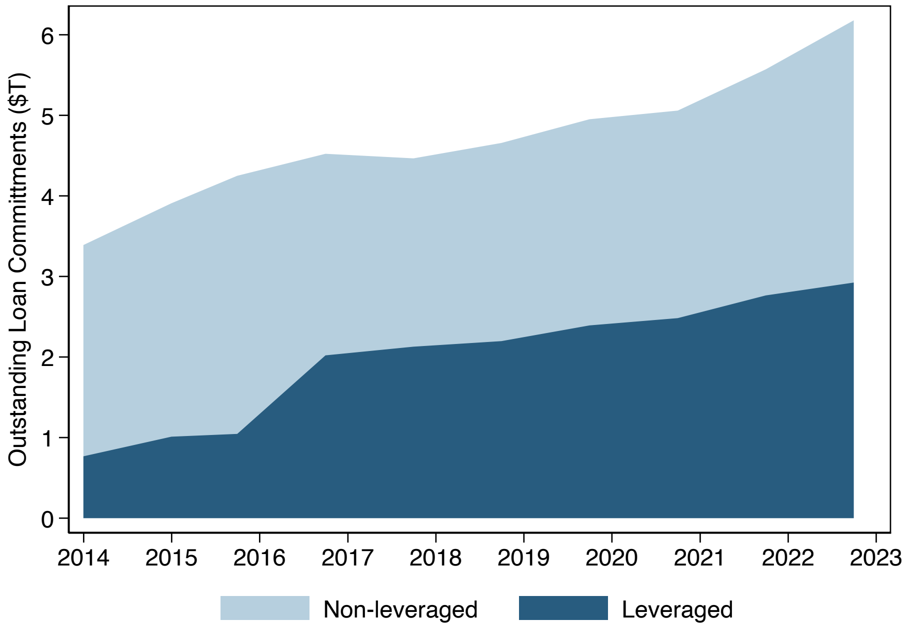

Figure 3. Growth of the Leveraged Lending Market

as much as the non-leveraged share. As this chart illustrates, leveraged loans are indeed significantly riskier than non-leveraged loans, and are predominantly non-investment grade.

3.3 Borrowers and Banks

In the final part of this section, we analyze the differences in bank and borrower characteristics between leveraged and non-leveraged loans. To do this compactly, we use our Y-14Q sample to regress a dummy variable for leveraged loans against bank and firm characteristics, implementing various sets of fixed effects. Formally, we estimate the following linear probability model:

$$\text{Leveraged Loan}_{l,b,f,s,t} = \mathbf{X}_{b,t}\beta_1 + \mathbf{Y}_{f,t}\beta_2 + \text{FE}_{b,f,s,t} + \epsilon_{l,b,f,s,t}, \quad (1)$$

where Leveraged $\text{Loan}_{l,b,f,s,t}$ is the leveraged loan flag of loan l, which was originated by bank b to firm f operating in sector s in quarter t. The set of bank characteristics is captured by $\mathbf{X}_{b,t}$, which contains the log size, equity–assets ratio, and non-performing loan (NPL) ratio of bank b in quarter t. The firm characteristics are in $\mathbf{Y}_{f,t}$, which has the log size, debt–EBITDA ratio, cash–assets ratio, tangibility ratio, and sales–asset ratio of firm f in quarter t. We control for industry-wide shocks over time using year–sector fixed effects, and add bank and firm fixed effects to control for time-invariant supply-side and demand-side effects. In the most stringent specification, we use firm–bank fixed effects to address heterogeneity in each banks' treatment of the same borrower.

Table 2 presents the results. The first two columns focus on the banks that originate leveraged loans. In the specification with firm fixed effects, we see that a 1% increase in bank total asset size is associated

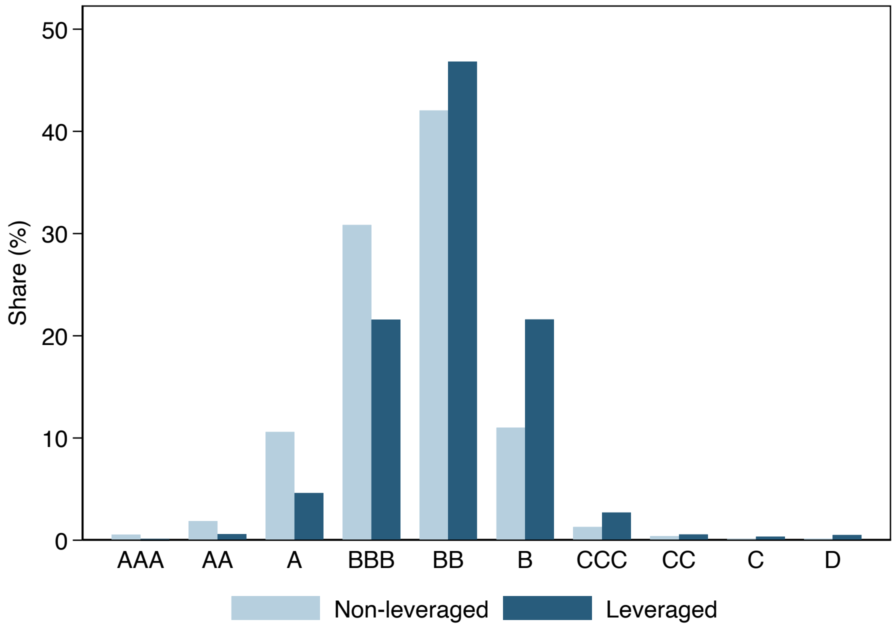

Figure 4. Risk Profile of Leveraged and Non-leveraged Loans

with a 5.9% greater probability of a new loan being leveraged, showing that larger banks are more likely to participate in the leveraged lending market. We also note that a 1-percentage point increase in the capitalization ratio is associated with a 0.43% greater likelihood of originating a leveraged loan; better-capitalized banks tend to be leveraged loan originators. Finally, a 1-percentage point increase in the bank's non-performing loan ratio is tied to a 1.7% lower probability of originating a leveraged loan. These results are new to the literature and show that larger, healthier banks are more likely to participate in the leveraged lending market.

TABLE 2 ABOUT HERE.

The next three columns add firm characteristics. In the third column, which includes year–sector and bank fixed effects, our estimates imply that a 1%-increase in a firm's total assets significantly increases their probability of being a leveraged loan borrower by 0.6%. This also holds in the stringent specification with firm–bank fixed effects. Larger firms are more likely to borrow using leveraged loans, consistent with the effort required on the part of banks to syndicate and place leveraged loans with investors. Next, we show that an increase in the debt–EBITDA ratio of 1 (e.g., from 5 to 6X) is associated with a 0.2–0.4% greater likelihood of being a leveraged loan borrower across our three specifications. This result is in line with definitions of leveraged loans that include debt–EBITDA ratios, showing that leveraged firms are significantly more likely to be leveraged loan borrowers. The next three rows show that 1-percentage point increases in the cash–assets ratio, tangibility ratio, and sales–asset ratio lead to respective decreases in the probability of a loan being leveraged of 0.73–1.45%, 0.03–0.54%, and 0.01–0.02%, where nearly all coefficients are statistically significant. Overall, these results show that loans are more likely to be leveraged when they go to larger, more leveraged, and financially weaker firms, consistent with their reputation as riskier loans.

4 Main Results

4.1 Monetary Policy Transmission Through Leveraged Loans

In order to test our hypothesis that monetary policy transmission is weakened within the leveraged loan market, we focus on the response of interest rate spreads for newly-originated loans to unexpected shocks to the federal funds rate. Our dependent variable for spread is the difference between the loan's interest rate as reported in the Y-14Q and that of a comparable maturity treasury. The monetary policy shock proxy is from Swanson (2021) and captures unexpected changes to the federal funds rate by observing the high-frequency market for federal funds futures around FOMC announcements. We saturate the model with various fixed effects, capturing the dynamics of underlying factors that may affect loan pricing terms. First, including sector–time (i.e., industry–time) fixed effects, we control for time-varying unobserved factors specific to each industry and common across all banks lending to firms in the same industry. Controlling for loan-type fixed effects allows us to compare the rate structure of loans of the same type. With (lead) bank–time fixed effects, we account for time-varying unobserved heterogeneity across bank lenders, such as differences in bank regulatory capital—an important driver of loan sales (Irani, Iyer, Meisenzahl, and Peydró 2021)—or internal risk models. Thus, we effectively compare observably similar leveraged and conventional non-leveraged loans of the same type and risk level, originated by the same lead bank, to borrowers in the same sector at a given point in time. In some specifications, we further include firm fixed effects to control for time-invariant characteristics that may be associated with loan pricing. In our loan-level regressions, we introduce *firm–time* fixed effects (Khwaja and Mian 2008) to account for any time-varying borrower characteristics, including its credit risk or credit demand which may attenuate the effects of monetary policy on loan pricing.[15] Thus, we effectively compare at a specific point in time observably similar loans to the *same* borrower, differing only in the nature of the loan structure (leveraged vs non-leveraged loans) made by the banks. We also include controls for firm characteristics, including leverage (debt–EBITDA ratio), size, and asset turnover (sales–assets ratio). We cluster standard errors at the firm level to allow for correlation within a given borrower.

Formally, we estimate the following main model at the loan level:

$$\begin{aligned}\text{Spread}_{l,b,f,s,t} = {} & \beta_1 \text{Leveraged Loan}_{l,b,f,s,t} + \beta_2 \text{FFR Shock}_t \\ & + \beta_3 \text{Leveraged Loan}_{l,b,f,s,t} \times \text{FFR Shock}_t + \text{FE}_{b,f,s,t} + \epsilon_{l,b,f,s,t}, \end{aligned} \tag{2}$$

15. Firm–time fixed effects ensure that any estimated effect does not come from changes in firm demand over time. While this method improves the robustness of the identification, the inclusion of firm–time fixed effects eliminates loan observations from firms that only borrow from a single bank in a given quarter. A key feature of the Y-14Q dataset is its large portion of small and medium sized enterprises (SMEs), which are disproportionately likely to be such firms. Dropping many observations in this manner risks harming external validity, so we therefore also include the weaker specifications of firm fixed effects and firm financial controls in other specifications. We also choose to implement our Khwaja and Mian (2008) fixed effects on the firm–year level, rather than firm–quarter, to reduce singleton dropping.

where $\text{Spread}_{l,b,f,s,t}$ is the interest rate spread on loan l originated by bank b, to firm f in sector s at time t. $\text{Leveraged Loan}_{l,b,f,s,t}$ is the leveraged loan flag assigned by the originating bank. FFR Shock_t is the most recent federal funds rate shock at time t. The coefficient β_1 measures the average difference in spread between leveraged and conventional loans, while β_2 is the average spread response of non-leveraged loans to an unexpected contractionary shock to the federal funds rate. The main coefficient of interest is β_3, which gives the difference between leveraged and non-leveraged loans in their spread response to monetary policy shocks. If this coefficient is negative, then newly-originated leveraged loans receive lower spreads than non-leveraged loans in response to contractionary monetary policy shocks, supporting our hypothesis.

Table 3 reports the results. We confirm that leveraged loans in our data are associated with a significantly higher spread than traditional loans—43 basis points higher in the specification with firm controls. Second, we show that the impact of federal funds rate shocks on loan spreads is positive and significant, with a one-standard-deviation shock being associated with an approximately 3 basis point greater spread on loans originated shortly afterwards. Hence, monetary policy is effective at increasing spreads charged on new originations.

TABLE 3 ABOUT HERE.

Critically, our estimations return significant negative coefficients on the β_3 interaction term across all specifications. A comparison between the economic magnitude of the coefficient of the interaction term relative to the coefficient of the (non-interacted) federal funds rate shock reveals substantial *reductions* in monetary pass-through for leveraged loans compared to non-leveraged loans. The effects range between −125% in column 4 and −230% in column 1. In other words, leveraged loan borrowers are shielded from the effects of contractionary monetary policy relative to non-leveraged loans. Notably, in the most rigorous specification—where we control for changes in firm credit demand over time—our results continue to hold, suggesting that monetary policy tightening has a strong differential effect on leveraged loans compared to otherwise similar traditional loans, even if both loans are offered by the *same bank* to the *same borrower* in the *same quarter*.

Since our estimates of the interaction coefficient β_3 are larger in magnitude than the federal funds rate shock coefficient β_2, we naturally ask whether the spreads on leveraged loans decline in *absolute terms* in response to monetary policy shocks, rather than just relative to non-leveraged loans. To do this, we perform a Wald test on the hypothesis $\beta_2 + \beta_3 = 0$, finding the total overall change in leveraged loan spreads is only significantly negative for the first two columns. This is not an unexpected result: As we will show in Table 5 below, the volume of originated leveraged loans *increases* in response to monetary policy shocks. This is partly due to the floating-rate structure of most leveraged loans, which attracts investors during higher-rate environments. Indeed, Cetorelli, La Spada, and Santos (2023) show that mutual funds holding floating-rate loans receive inflows in response to monetary tightenings.

Contractionary monetary policy does not only seek to impact the interest rate charged on loans, but also involves a broader tightening in credit conditions. We additionally test how other loan terms like size and maturity change for leveraged loans after monetary policy shocks. Table 4 reports the results of our main specification with these new dependent variables. All columns consistently show that although monetary policy tightening succeeds in reducing credit supply—reflected by smaller loan sizes and shorter maturities—leveraged loans are spared from much of the tightening effects. This result is consistent with our main finding on loan spread that leveraged loans are shielded from banks' restrictive credit supply after monetary policy tightening, benefit from non-banks' reliance on long-term funding sources, and the absence of the maturity mismatch observed for banks.

TABLE 4 ABOUT HERE.

In all, the evidence we find supports the claim that banks shield leveraged loan borrowers from the effects of rate hikes after monetary policy tightens. To the best of our knowledge, this finding is novel to the literature. It highlights an important and yet overlooked impediment for monetary policy pass-through and suggests that some characteristic of leveraged loans leads banks to provision better terms during federal funds rate hikes.

4.2 Number of Loans Originated

We next conduct an analysis to investigate whether the observed reduction in loan spreads for leveraged loans during monetary policy tightening is accompanied by a simultaneous shift in the number of new loan originated. We specifically address whether a smaller number of higher quality leveraged loans are originated after contractionary monetary policy shocks and thus receive lower interest rates. Table 5 presents the results of this analysis, in which we regress the number of loans originated on a leveraged loan indicator, federal funds rate shock, and their interaction, with various fixed effects included across specifications.

TABLE 5 ABOUT HERE.

Column 1 shows the baseline results with only time fixed effects, indicating that while the main effect of the leveraged loan flag is positive, the interaction term (Leveraged Loan × FFR Shock) is positive and statistically significant at the 5% level, suggesting that the volume of leveraged loans *increases* relative to non-leveraged loans when monetary policy tightens. This finding is reinforced in column 2, which controls for bank fixed effects, and in column 3, which includes bank–quarter fixed effects to control for time-varying bank-specific factors. In both cases, the interaction term remains positive and statistically significant at the 1% level, with magnitudes increasing across specifications.

Contrary to an alternative argument that the relatively lower rate charged on leveraged loans could be driven by a smaller number of higher-quality leveraged loans, we find that leveraged loans actually experience an increase in new origination volumes during monetary tightening. This finding aligns with the notion that non-bank investors such as collateralized loan obligations (CLOs) are not as constrained by short-term funding pressures as banks and thus can purchase leveraged loans when rates rise. In contrast, banks demand higher returns on the traditional loans that they continue to hold on their balance sheets to compensate for increased funding costs due to deposit outflow. The increase in the number of leveraged loans originated during monetary tightening further supports our main hypothesis that the originate-to-distribute model allows leveraged loans to be shielded from the adverse effects of rising interest rates on bank lending. Now that we have established that monetary policy transmission is weakened within the leveraged loan market, we turn to mechanisms that might explain this result.

5 Mechanisms

5.1 Heterogeneity in Participants

Unlike conventional loans that are held on banks' balance sheets, leveraged loans are designed to be sold to financial institutions (DeMarco, Liu, and Schmidt-Eisenlohr 2020). For example, in the SNC dataset—a sample which over-represents large syndicated deals with many bank participants—33% of leveraged loans' commitment value is held by non-banks, while only 9% is for non-leveraged loans. These non-bank funds are financed by long-term investments from institutions like endowments and pensions and thus do not encounter the classic maturity mismatch problem that is fundamental to banks. Since they are largely immune to the run risk associated with fluid deposit outflow, non-bank leveraged loan investors do not face short-term pressure to pay higher rates on long-term liabilities in response to monetary policy shocks—they need not demand an immediate increase in their lending rate on the asset side. Critically, this novel channel of monetary policy transmission through leveraged loans is distinct from those affecting conventional loans that are held on banks' balance sheets and funded through fluid deposits.[16] Since leveraged loans are funded by more patient investors, we expect them to be less affected by contractionary monetary policy, creating weakened monetary transmission.

To test this hypothesis, we ask whether the liability type of the ultimate loan holder drives the differential effects of monetary tightening on lending rates. As shown earlier, leveraged loans differ from non-leveraged loans in many meaningful ways, so our analysis must be able to separate factors that are associated with liability type from those that affect other loan outcomes. To do this, we first examine differences in pricing between leveraged loan tranches that are held by the originating bank (e.g., to monitor covenants) and those that are distributed to syndicate banks and non-banks. Since these "held" tranches have a similar funding maturity to traditional bank loans, we should see stronger monetary transmission there than in "distributed" loans if our hypothesis holds. Importantly, we perform this comparison of liabilities *within* the class of leveraged loans, so a difference in transmission should only arise from factors related to either maturity mismatch or the act of distribution *per se*, and not from some leveraged-loan-specific feature like the riskiness of the borrower.

Our empirical model is the same as that in Section 4.1, except now the "Leveraged Loan" indicator is decomposed into the mutually exclusive "Held Leveraged Loan" and "Distributed Leveraged Loan" categories. We make this determination based on whether the (non-lead bank) participants' loan share variable reported in the Y-14Q is nonzero.

16. For instance, the deposits channel of monetary policy (Drechsler, Savov, and Schnabl 2017) suggests that banks face immediate pressure to raise deposits and loan spreads to prevent outflows of fluid deposits after contractionary monetary shocks, a dynamic which played a major role in the failure of Silicon Valley Bank in 2023.

Table 6 presents the results from contrasting held and distributed loans. The first two rows indicate that both types of leveraged loans demand a greater spread on average, in line with our earlier results. The specification with firm fixed effects—which allow us to compare leveraged and non-leveraged loans to the same firm—shows that held leveraged loans have a spread that is on average 10 basis points greater than traditional loans, while for distributed leveraged loans it is 12 basis points greater than traditional loans. We expect to observe a somewhat greater baseline spread for distributed leveraged loans than held since held tranches often carry more covenants (Berlin, Nini, and Yu 2020) and arranging banks consider the potential for future fee-based revenue sources like cash and pension fund management in pricing (S&P Global 2020). All the columns are consistent with these observations. The third row reports the impact of a 1-standard-deviation contractionary shock to the federal funds rate on loan spreads, finding a significant 2.1 to 3.6 basis point rise across specifications, in line with our main results.

TABLE 6 ABOUT HERE.

Across all four specifications, there is no significant evidence that monetary policy transmission differs between held leveraged loan tranches and traditional loans. Meanwhile, all the coefficients for distributed leveraged loan tranches are highly significant, with point estimates slightly larger in magnitude than our main results. These results indicate that while monetary policy transmission through held leveraged loans is not significantly different than through traditional loans, the spreads on distributed leveraged loans rise between 4.6 and 7.6 basis points less than traditional loans in response to a 1-standard-deviation unexpected shock to the federal funds rate.

Similar to Section 5.1 above, notice that by summing the federal funds rate shock coefficient and the interaction terms, it appears that total spreads on distributed leveraged loans decline in response to monetary policy shocks. We run a Wald test to evaluate this observation, finding that an absolute decline is statistically significant (albeit sometimes only weakly) across all of our estimations. Again, this aligns with the open-end loan-fund inflows of Cetorelli, La Spada, and Santos (2023), especially since 51% of held leveraged loans are floating-rate, compared to 71% of distributed leveraged loans. The declines we observe seem attributable to non-bank investors' preferences for floating-rate instruments during periods of tight monetary policy.

In all, we have shown that weakened monetary transmission is concentrated in distributed leveraged loan tranches, supporting the view that the mechanism through which leveraged loans dampen monetary transmission relates to the act of their distribution or the characteristics of distributed loan investors (e.g., their liability maturities), rather than a feature of the leveraged loan ecosystem as a whole, like elevated borrower default risk.

5.2 Heterogeneity in Maturity Mismatch

We next perform an analysis that specifically isolates the liability maturity dynamic of leveraged loans' monetary policy response. Whenever a leveraged loan is originated, the distributed commitment value is divided into a set of revolvers, Term Loan As, and Term Loan Bs. Term Loan As are amortizing term loans that are primarily sold to other banks within the syndicate, while Term Loan Bs are non-amortizing term loans that are sold to non-bank institutional investors, such as CLOs (Fleckenstein, Gopal, Gallardo, and Hillenbrand 2024). If indeed reduced liability maturity mismatch drives our weakened monetary transmission, then we should observe the strongest dampening in loans held by non-bank financial institutions (Term Loan Bs), and not those held by syndicate banks (Term Loan As), since the loan funding for such tranches is comparable to traditional loans.

We identify leveraged Term Loan As in our sample as distributed leveraged term loans that amortize. We say that a loan amortizes if its commitment value declines consistently across observed quarters. We identify the remaining non-amortizing distributed leveraged term loans as leveraged Term Loan Bs. There are 4,681 leveraged TLAs and 7,066 leveraged TLBs in our sample. The average leveraged TLA facility has a size of $28.9 million, while the average leveraged TLB facility has a size of $68.8 million. Our model is analogous to that used above to compare held and distributed leveraged term loans, except here we restrict our sample to only term loans (i.e., we exclude revolvers) so that our base category can be interpreted as traditional term loans.

Table 7 reports the results. We see from the first two rows that both leveraged Term Loan As and Bs are generally priced with a premium over traditional loans. This premium is noticeably larger for Term Loan Bs, though, with point estimates ranging from 9 to 61 basis points depending on the specification, compared to 0 to 30 basis points for Term Loan As. Since Term Loan Bs are often subordinate to Term Loan As in the capital structure and syndicate banks also consider fee-based revenue opportunities—as discussed above—this difference in average spread is expected. The third row reflects the same result as our previous tests—shocks to the federal funds rate significantly impact loan spreads in the same direction as the shock.

TABLE 7 ABOUT HERE.

The final two rows reveal a stark difference in the response of leveraged Term Loan As and Bs to monetary policy shocks. Unexpected shocks to the federal funds rate raise leveraged Term Loan B spreads significantly less than traditional term loans, with pass-through reductions of between −168% and −262%. In contrast, there is no significant difference in the response to unexpected monetary policy shocks of leveraged Term Loan A spreads and those of traditional term loans.[17] Thus, weakened monetary policy transmission is present only in leveraged loan tranches that are distributed to non-bank investors. This provides strong evidence in support of our working hypothesis, since the primary difference between these tranches is the ultimate loan investor. Moreover, since non-bank investors have liabilities of a significantly longer maturity on average than bank deposits, this result suggests that the average liability maturity mismatch between leveraged and traditional loans may be a significant driver of weakened monetary policy transmission through the leveraged loan market.

17. Here, we again run a Wald test to determine whether leveraged Term Loan B spreads decline absolutely in response to monetary policy shocks, finding only a weakly significant result for the first column ($p = 0.076$). Since, 87% of leveraged Term Loan As and 78% of leveraged Term Loan Bs are floating-rate, a weaker total decline than the held versus distributed comparison in Table 6 is expected.

5.3 Borrower Characteristics

We next investigate how weakened monetary transmission varies across borrowers with different characteristics. Specifically, we perform a sub-sample analysis to identify the types of borrowers where our main result is most pronounced. This allows us to investigate how the observed loan spread dynamics of leveraged loans issued under the originate-to-distribute model differ from the conventional loans issued under the originate-to-hold model across borrowers of various characteristics during monetary policy shocks.

We begin by testing whether borrower fundamentals play a role in the observed differential response of leveraged and traditional loans to monetary policy shocks. To this end, we split the sample based on three firm-level characteristics commonly mentioned in loan contracts: debt–EBITDA ratio (leverage ratio), interest coverage ratio (ICR), and cash flow ratio. These variables are the common metrics used in the industry to assess leveraged loan borrowers' capacity to service their debt, which is the key factor in default risk given the elevated level of debt at these firms. We test whether the main results for leveraged loans are concentrated among firms with stronger financial profiles.

Columns 1 and 2 in Table 8 present the results for firms split by their debt–EBITDA ratios (above or below 6).[18] In comparison to similar non-leveraged loans offered by the same bank to firms in the same industry during the same quarter, the interest spreads charged on leveraged loans are 41.1 and 46.0 basis points higher for firms with debt–EBITDA ratios above and below 6, respectively. Consistent with the baseline results, investors are compensated for the higher risks associated with holding these loans. It is interesting to note that when there are contractionary shocks to monetary policy, spreads only increase for companies with lower debt–EBITDA ratios (less than 6). This indicates that banks may hesitate to raise interest rates for struggling borrowers with limited ability to repay their debts, potentially reflecting "zombie lending"—a phenomenon wherein banks extend a lifeline to weaker borrowers to keep them afloat. In other words, banks could have an incentive to raise rates for healthy firms that can handle higher interest costs, while deferring increases for the most stressed firms. The negative coefficient on the interaction between leveraged loans and monetary policy shocks suggests that for healthier firms with debt–EBITDA ratios of 6 or below, leveraged loans receive significantly lower spreads than comparably similar non-leveraged loans. This indicates that leveraged loans to healthier firms are shielded from higher borrowing costs. However, the positive insignificant interaction term for weaker firms with debt–EBITDA ratios above 6 indicates that only good-quality leveraged borrowers receive better terms after monetary policy shocks. This suggests that investors pay close attention to the quality of the underlying assets; only leveraged loans from borrowers with stronger fundamentals remain popular among investors who, unlike banks, do not depend on fluid deposits as funding sources and are thus shielded from otherwise immediate rate hikes observed on similar loans held by banks.

TABLE 8 ABOUT HERE.

18. We use 6 as our cutoff for the debt–EBITDA ratio since it is often used in industry and regulatory practice to determine whether a firm is excessively leveraged. For example, the Federal Reserve's *Interagency Guidance on Leveraged Lending* states that "a leverage level after planned asset sales ... in excess of 6X Total Debt/EBITDA raises concerns for most industries" (Board of Governors of the Federal Reserve System 2013).

Next, we examine whether firms' ability to cover interest payments attenuates the effect of monetary policy on leveraged loan spreads. We split the sample based on an interest coverage ratio threshold of 2. Similar to the debt–EBITDA analysis, we observe rising rates among loans only to firms with stronger repayment capacity, suggesting zombie lending behavior by banks towards weaker-quality borrowers. More importantly, the negative coefficient on the interaction term is significant only for firms with ICRs greater than 2, indicating that firms with a greater capacity to service their debt are spared from paying higher loan spreads when monetary policy tightens. This provides further evidence that only leveraged loans to borrowers with stronger fundamentals are shielded from rising rates. Such loans are popular among non-bank investors who are not reliant on short-term deposit funding but are cognizant of underlying borrower fundamentals.

Cash flow ratios capture firms' liquidity and can be used as a measure for their ability to service higher interest expenses under rising interest rates (Acharya, Almeida, and Campello 2007). We split the sample at the 25th percentile; firms with cash flow ratios above the 25th percentile are considered to have stronger liquidity, while those below the threshold have weaker liquidity. The results align with our previous findings. Banks only raise rates on stronger borrowers with strong cash flow ratios and spare the weaker ones. The negative interaction coefficient is significant only for leveraged loans to firms with higher cash flow ratios, suggesting that firms with better liquidity are partially shielded from rising interest rates, a benefit of non-bank investors' long-term funding sources.

Overall, these sub-sample results indicate that the relatively lower funding costs for leveraged loans are driven by firms with stronger fundamentals. Although we do not directly address this in our regressions, this could potentially be due to the fact that diversified non-bank investors lack the firm balance-sheet exposure required to create incentives to "gamble for resurrection" and engage in zombie lending. Moreover, since non-banks are predominately funded by long-term liabilities, they are better positioned to weather short-term losses and are thus freed to focus on lending to creditworthy borrowers in the originate-to-distribute market.

5.4 Bank–firm Relationships

Next, we explore whether preexisting relationships between banks and borrowers influence loan spread dynamics. Specifically, we test whether banks with "skin in the game"—i.e., those that already hold loans on their balance sheets or have longstanding lending relationships with leveraged loan borrowers—are more likely to extend favorable terms to these borrowers during periods of monetary tightening.

The first two columns of Table 9 split the sample based on whether borrowers had existing loans on the bank's balance sheet at the time of new loan origination. We find that the effect of a contractionary monetary policy shock on leveraged loan spread is twice as large for firms without preexisting loans on the bank's balance sheet. This result provides further evidence of banks' self-serving incentives during monetary tightening, since banks are reluctant to raise rates on loans to borrowers who have existing loans on banks' balance sheets. By doing so, they help mitigate potential growth in the credit risk of existing loans by shielding these borrowers from sharp rises in interest expense.

TABLE 9 ABOUT HERE.

Similarly, we test whether medium-term prior lending relationships between the borrower and the bank (looking back three years) impact the rate spread on new loans in the latter two columns of Table 9. Once again, we find that the negative coefficient on the interaction term is much stronger for borrowers without a prior lending relationship. This finding further supports the argument that the shielding effect is driven by market forces in the originate-to-distribute model rather than by banks attempting to protect existing relationships or avoid defaults on loans already on their balance sheets.

Together, these results suggest that banks are not using their relationships with borrowers to provide more favorable loan terms during periods of monetary tightening. The muted effects of monetary policy on leveraged loans is not driven by banks' behavior aimed at preserving relationships or the agency problem of feeding borrowers with connections.

5.5 Loan Renegotiation

Before concluding, we address the potential limitation of focusing solely on loan originations to capture the effects of monetary policy shocks. While loan spreads on newly originated loans are expected to reflect changes in monetary policy conditions, the commercial loan market is characterized by frequent renegotiations, which can be an alternative channel for monetary pass-through (Roberts and Sufi 2009; Bradley and Roberts 2015). In this section, we ask whether weakened monetary policy transmission in leveraged loans occurs in the context of renegotiations.

Table 10 reports the results from an analysis examining how monetary policy shocks impact loan interest spread through renegotiations, specifically focusing on the rate changes for leveraged and traditional loans. The models include several specifications to control for various fixed effects and firm characteristics.

TABLE 10 ABOUT HERE.

The first four columns analyze changes in loan spreads upon renegotiation. Across the specifications without firm fixed effects, the coefficient for the leveraged loan indicator is positive and highly significant, indicating that renegotiated leveraged loans are associated with higher changes in spread compared to renegotiated traditional loans. Nonetheless, neither the standalone effects of monetary policy shock nor the interaction term between the leveraged loan indicator and monetary policy shock appear significant in any specification. Our results thus suggest that (1) loan renegotiation is not a main channel that transmits monetary policy shocks, and (2) monetary policy shocks do not significantly alter the spread adjustment for renegotiated leveraged loans relative to non-leveraged loans.

6 Conclusion

Our paper has shown that leveraged loans radically differ from conventional, non-leveraged loans in the response of their terms to monetary policy. The originate-to-distribute model that produces leveraged loans reduces the effective maturity mismatch between funders' assets and liabilities by attracting patient, non-bank participants into the loan market, disrupting the deposits channel of monetary policy (Drechsler, Savov, and Schnabl 2017) and significantly reducing pass-through. This weakened transmission is concentrated within healthier borrowers, reflecting investor preferences and mitigating zombie lending by banks. At the same time as individual leveraged loans are shielded, the total number of leveraged loans originated *increases* in response to monetary policy shocks. For all these reasons, the rise of leveraged lending represents a sea change in the way that monetary policy operates within credit markets.

It is important to note that these results are not driven by the sort of regulatory arbitrage that causes non-bank participation in credit markets to grow following new bank rules (Kim, Plosser, and Santos 2018). The liability maturity mechanism that we bring to bear in our analysis is a structural feature of non-bank lenders—without actively reducing the participation of non-banks in leveraged loans, a regulation likely cannot easily restore the effectiveness of monetary transmission within this ecosystem. Further work is needed to determine the implications of this new lending structure for corporate borrowers and credit cycles. Indeed, if increased non-bank participation in bank lending improves borrowers' access to credit across the business cycle, we may come to view the rise of leveraged loans as a key financial innovation that improves economic stability and growth.

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Table 1. Summary Statistics

A: Loans					Sub-sample Mean	
	Count (1)	Mean (2)	SD (3)	Median (4)	LL (5)	Non-LL (6)
Size ($MM)	208 066	29.17	100.82	6.73	47.41	23.85
Utilization (%)	208 066	51.02	45.85	52.25	47.32	52.10
Spread (bp.)	140 281	222.26	123.58	202.00	255.78	212.15
Maturity (mo.)	208 066	42.96	30.98	48.00	48.52	41.34
Sub-investment (%)	208 066	59.86	49.02	100.00	72.58	56.15
Syndicated (%)	208 066	36.53	48.15	0.00	65.16	28.19
Senior Lien (%)	208 066	97.66	15.11	100.00	99.36	97.17
Secured (%)	208 066	74.40	43.64	100.00	76.01	73.93
Floating Rate (%)	208 066	53.22	49.90	100.00	64.54	49.93
Renegotiated (%)	208 066	1.39	11.69	0.00	2.59	1.03
B: Firm-quarters	(7)	(8)	(9)	(10)		
Size ($B)	112 197	5.59	32.89	0.08		
Debt–EBITDA	112 203	2.82	5.79	1.97		
Cash–assets (%)	112 203	10.36	13.00	5.32		
Tangiblility (%)	112 203	87.45	19.61	98.02		
Sales–assets (%)	112 203	179.58	133.38	153.76		
C: Bank-quarters	(11)	(12)	(13)	(14)		
Total Assets ($B)	785	580.58	800.80	205.55		
Equity–assets (%)	785	10.90	2.49	10.90		
Non-performing (%)	785	0.83	0.67	0.66		

Notes. There are 46,965 leveraged loans and 161,101 non-leveraged loans in the sample.

Table 2. Characteristics of Leveraged Loan Originating Banks and Borrowing Firms

	Leveraged loan				
	(1)	(2)	(3)	(4)	(5)
Bank characteristics:					
Bank size	0.058***	0.059***	0.029***	0.036***	0.039***
	(0.009)	(0.011)	(0.009)	(0.011)	(0.011)
Equity–assets ratio	1.200***	0.431**	1.408***	0.915***	0.635***
	(0.201)	(0.204)	(0.204)	(0.207)	(0.220)
NPL ratio	−2.295***	−1.734***	−2.019***	−1.699**	−1.019
	(0.605)	(0.627)	(0.633)	(0.682)	(0.717)
Firm characteristics:					
Firm size			0.006***	0.003	0.006**
			(0.002)	(0.003)	(0.003)
Debt–EBITDA ratio			0.004***	0.002***	0.002***
			(0.000)	(0.000)	(0.000)
Cash–assets ratio			−0.145***	−0.073***	−0.083***
			(0.022)	(0.024)	(0.022)
Tangible asset ratio			−0.540***	−0.003	−0.028
			(0.016)	(0.028)	(0.026)
Sales–assets ratio			−0.014***	−0.018***	−0.015***
			(0.002)	(0.004)	(0.004)
Year–sector FE	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	N
Firm FE	N	Y	N	Y	N
Firm–bank FE	N	N	N	N	Y
R-sqr	0.118	0.586	0.207	0.585	0.780
N	240432	212353	208066	185441	170239

Notes. Standard errors are clustered at the firm level. Bank and firm size are in logs. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3. Effects of Monetary Policy Shocks on Leveraged Loan Spreads

	Loan Spread			
	(1)	(2)	(3)	(4)
Leveraged Loan	42.351***	43.337***	11.158***	4.742***
	(2.009)	(1.768)	(1.261)	(1.267)
FFR Shock	2.994***	2.850***	2.233***	3.790***
	(0.689)	(0.711)	(0.608)	(0.779)
Leveraged Loan × FFR Shock	−6.887***	−6.038***	−3.882***	−4.720***
	(1.776)	(1.688)	(1.237)	(1.412)
Loan Type FE	Y	Y	Y	Y
Bank–quarter FE	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y
Firm Controls	N	Y	N	N
Firm FE	N	N	Y	N
Firm–year FE	N	N	N	Y
R-sqr	0.233	0.294	0.698	0.784
N	159168	140299	134105	103404

Notes. Standard errors are clustered at the firm level. We perform Wald tests to determine whether the spreads on leveraged loans decrease absolutely in response to a federal funds rate shock. That is, we test the hypothesis that $\beta_2 + \beta_3 = 0$. The p-values of this test for each of the four respective columns are 0.029, 0.057, 0.178, and 0.516. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4. Effects of Monetary Policy Shocks on Leveraged Loan Sizes and Tenors

A: Loan Size	Loan Size			
	(1)	(2)	(3)	(4)
Leveraged Loan	0.677***	0.436***	0.267***	0.213***
	(0.014)	(0.020)	(0.012)	(0.013)
FFR Shock	−0.014*	−0.017***	−0.007	−0.010
	(0.008)	(0.006)	(0.005)	(0.008)
Leveraged Loan × FFR Shock	0.040***	0.046***	0.029***	0.024*
	(0.013)	(0.012)	(0.011)	(0.013)
Loan Type FE	Y	Y	Y	Y
Bank–quarter FE	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y
Firm Controls	N	Y	N	N
Firm FE	N	N	Y	N
Firm–year FE	N	N	N	Y
R-sqr	0.255	0.417	0.647	0.702
N	240499	208100	212425	172673
B: Maturity	Maturity			
	(5)	(6)	(7)	(8)
Leveraged Loan	0.346***	0.275***	0.178***	0.182***
	(0.011)	(0.017)	(0.009)	(0.010)
FFR Shock	−0.011**	−0.015***	−0.009*	−0.003
	(0.005)	(0.005)	(0.005)	(0.007)
Leveraged Loan × FFR Shock	0.023***	0.031***	0.028***	0.005
	(0.008)	(0.008)	(0.008)	(0.010)
Loan Type FE	Y	Y	Y	Y
Bank–quarter FE	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y
Firm Controls	N	Y	N	N
Firm FE	N	N	Y	N
Firm–year FE	N	N	N	Y
R-sqr	0.203	0.197	0.546	0.651
N	240499	208100	212425	172673

Notes. Standard errors are clustered at the firm level. Dependent variables are in logs. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Number of Leveraged Loans Originated after Monetary Policy Shocks

	Loan Volume		
	(1)	(2)	(3)
Leveraged Loan	0.589	−22.464***	−23.698***
	(2.662)	(2.624)	(2.639)
FFR Shock	2.292	1.760	1.454
	(2.702)	(2.573)	(2.582)
Leveraged Loan × FFR Shock	7.920**	9.754**	10.603***
	(4.011)	(3.819)	(3.859)
Quarter FE	Y	Y	N
Bank FE	N	Y	N
Bank–quarter FE	N	N	Y
R-sqr	0.010	0.104	0.122
N	53206	53206	53194

Notes. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6. Effects of Monetary Policy Shocks on Held and Distributed Leveraged Loans

	Loan Spread			
	(1)	(2)	(3)	(4)
Held Leveraged Loan	31.694***	26.833***	9.541***	4.525*
	(2.324)	(2.186)	(2.015)	(2.606)
Distributed Leveraged Loan	46.471***	49.493***	12.255***	5.315***
	(2.464)	(2.175)	(1.504)	(1.432)
FFR Shock	2.932***	2.844***	2.149***	3.612***
	(0.691)	(0.716)	(0.611)	(0.785)
Held LL × FFR Shock	−3.604	−3.474	−0.928	−0.162
	(2.529)	(2.600)	(2.065)	(3.024)
Distributed LL × FFR Shock	−7.623***	−6.454***	−4.682***	−5.977***
	(2.145)	(2.031)	(1.436)	(1.488)
Bank–quarter FE	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y
Firm Controls	N	Y	N	N
Firm FE	N	N	Y	N
Firm–year FE	N	N	N	Y
R-sqr	0.232	0.292	0.697	0.784
N	159168	140299	134105	103404

Notes. Standard errors are clustered at the firm level. We perform Wald tests to determine whether the spreads on held and distributed leveraged loans decrease absolutely in response to a federal funds rate shock. That is, we test the hypotheses $\beta_3 + \beta_4 = 0$ and $\beta_3 + \beta_5 = 0$. For held leveraged loans, the p-values of this test for each of the four respective columns are 0.787, 0.805, 0.547, and 0.241. For distributed leveraged loans, they are 0.030, 0.076, 0.079, and 0.126. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7. Effects of Monetary Policy Shocks on Leveraged Term Loan As and Bs

	Loan Spread			
	(1)	(2)	(3)	(4)
Leveraged Term Loan A	29.563***	28.853***	2.498	0.120
	(2.823)	(2.634)	(2.024)	(1.944)
Leveraged Term Loan B	60.199***	60.948***	14.698***	8.640***
	(3.942)	(3.691)	(2.191)	(2.098)
FFR Shock	3.885***	4.025***	3.077***	3.313***
	(0.977)	(0.951)	(0.825)	(1.120)
Leveraged TLA × FFR Shock	−1.676	−2.373	−1.349	−2.986
	(4.347)	(4.076)	(3.012)	(3.483)
Leveraged TLB × FFR Shock	−10.168***	−8.697***	−6.298***	−5.554**
	(3.516)	(3.168)	(1.967)	(2.377)
Bank–quarter FE	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y
Firm Controls	N	Y	N	N
Firm FE	N	N	Y	N
Firm–year FE	N	N	N	Y
R-sqr	0.286	0.346	0.807	0.886
N	55947	49615	40537	29159

Notes. Standard errors are clustered at the firm level. We perform Wald tests to determine whether the spreads on leveraged Term Loan As and Bs decrease absolutely in response to a federal funds rate shock. That is, we test the hypotheses $\beta_3 + \beta_4 = 0$ and $\beta_3 + \beta_5 = 0$. For leveraged TLAs, the p-values of this test for each of the four respective columns are 0.612, 0.685, 0.570, and 0.928. For leveraged TLBs, they are 0.076, 0.142, 0.110, and 0.391. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8. Impacts of Borrower Health on the Monetary Policy Response of Leveraged Loans

	Debt–EBITDA		Firm ICR		Cash Flow Ratio	
	≤ 6 Healthy	> 6 Unhealthy	> 2 Healthy	≤ 2 Unhealthy	$\geq 25^{pct}$ Healthy	$< 25^{pct}$ Unhealthy
	Loan Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Leveraged Loan	41.076***	46.038***	37.987***	59.097***	41.069***	47.173***
	(1.830)	(3.703)	(1.749)	(4.842)	(1.941)	(3.171)
FFR Shock	2.949***	1.024	2.827***	1.931	3.059***	1.859
	(0.709)	(1.954)	(0.727)	(2.329)	(0.793)	(1.432)
Leveraged Loan × FFR Shock	−6.377***	0.594	−6.957***	−0.860	−6.742***	−3.168
	(1.751)	(4.190)	(1.747)	(5.158)	(1.946)	(3.204)
Loan Type FE	Y	Y	Y	Y	Y	Y
Bank–quarter FE	Y	Y	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y	Y	Y
Firm Controls	Y	Y	Y	Y	Y	Y
R-sqr	0.293	0.421	0.295	0.397	0.286	0.372
N	119275	20969	122322	12488	104312	35943

Notes. Standard errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9. Impact of Relationship Lending on Leveraged Loans and Monetary Policy

	Loan on Balance Sheet		Bank–firm Relationship	
	No	Yes	No	Yes
	Loan Spread			
	(1)	(2)	(3)	(4)
Leveraged Loan	56.308***	38.920***	55.144***	38.466***
	(2.469)	(1.990)	(2.314)	(2.022)
FFR Shock	4.296**	2.408***	3.859**	2.511***
	(1.689)	(0.728)	(1.539)	(0.741)
Leveraged Loan × FFR Shock	−10.377***	−4.619***	−10.010***	−4.173**
	(3.497)	(1.766)	(3.103)	(1.801)
Loan Type FE	Y	Y	Y	Y
Bank–quarter FE	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y
Firm Controls	Y	Y	Y	Y
R-sqr	0.346	0.295	0.329	0.300
N	31579	108664	34747	105502

Notes. Standard errors are clustered at the firm level. "Loan on Balance Sheet" indicates that the bank has another loan to the borrowing firm on its balance sheet at the time of origination. "Bank–Firm Relationship" is true if the bank had or currently has another loan to the borrowing firm on its balance sheet at any point during the three years before origination. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10. Impact of Renegotiations on Loan Spreads during Monetary Shocks

	Change in Loan Spread			
	(1)	(2)	(3)	(4)
Leveraged Loan	2.735***	4.291***	1.879	−0.672
	(0.753)	(0.841)	(1.428)	(1.842)
FFR Shock	0.268	0.284	0.331	−1.033
	(0.417)	(0.462)	(0.505)	(0.946)
Leveraged Loan × FFR Shock	−1.068	−1.246	−0.389	1.213
	(1.127)	(1.154)	(1.254)	(2.054)
Loan Type FE	Y	Y	Y	Y
Bank–quarter FE	Y	Y	Y	Y
Sector–quarter FE	Y	Y	Y	Y
Firm Controls	N	Y	N	N
Firm FE	N	N	Y	N
Firm–year FE	N	N	N	Y
R-sqr	0.352	0.335	0.536	0.672
N	104387	84524	92785	62564

Notes. Standard errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A Dataset construction

Subsection A.1 Identifiers

Loans and banks are uniquely identified in Schedule H.1 of the Y-14Q, but the dataset lacks consistent firm identifiers across banks. Banks almost always report their own internal firm identifiers and occasionally report the firm's taxpayer identification number (TIN). They also report the name of the firm, which we clean by reformatting and removing or standardizing common abbreviations. Using these factors, we construct a unique firm identifier in the following manner. First, if several loans share an internal ID and at least one reports a TIN, we replace all missing TINs with the modal reported TIN. Next, we do the same for loans within a given bank that share a TIN but are missing internal IDs. Again, if firms share a name but are missing a TIN, we replace missing values with the modal TIN. Now, if a TIN is uniquely associated with only one obligor name within a given bank, we flag it (this is modeled after the cleaning process of Bidder, Krainer, and Shapiro (2021)). Then, we replace any missing TINs with the modal flagged TIN associated with each obligor name. If the TIN is still missing at this point, we simply replace it with a new ID based on the cleaned name. Finally, we choose our firm ID to be the TIN, the bank's internal ID, or the loan's internal ID, with preference for non-missing values in that order (i.e., if a TIN is available we choose that; if not, we move to internal IDs, and so on).

Subsection A.2 Cleaning

We apply the several loan-characteristic filters to the Y-14Q Schedule H.1 to obtain a clean sample of newly-issued loans. First, since our analysis concerns leveraged loans, we exclude observations for which the bank does not report whether a loan is leveraged. The Y-14Q did not consistently require this of banks until 2016Q4; hence, this where our sample begins. To focus on new loan originations, we exclude observations of outstanding loans; that is, we remove observations with origination dates more than one quarter before the reporting date. We drop loans with a committed exposure below $1 million, the official minimum size requirement for the Y-14Q. Since Schedule H.1 explicitly excludes "small business loans," we also drop loans reported with a small business "line of business" for consistency. We delete observations where the total size of the loan is larger than the size of the firm, where the utilized loan amount exceeds the overall size of the loan, or where the maturity is negative. We remove loans that do not report a tenor or have a tenor of greater than 30 years. We exclude loans whose obligor name is not reported or reported as "Individual", whose internal bank ID number is not reported, or whose loan size or utilized amount is missing. Finally, to address a small number of bank ID reporting errors, we remove loans from banks that are associated with fewer than 50 loan-quarters within the entire dataset.

We also filter loans based on their reported firm financials, excluding those whose values fail to satisfy the following basic accounting relationships: Total assets must not be negative, EBITDA must not exceed revenue, the value of asset sub-types (cash and marketable securities, fixed assets, tangible assets, current assets, current inventory, and accounts receivable) cannot exceed the value of total assets, the value of liability sub-types (short and long term debt and current liabilities) cannot exceed the value of total liabilities. To further improve the quality of reported firms' financials, we take the median value of each financial variable over all loan facilities that report the firm's financials across all banks in that quarter. If after taking these medians, a loan still has no reported firm financials or is missing data on the firm's total assets, we remove the observation. Then, to minimize the impact of poor reporting quality and outliers, we trim all firm financial variables, along with loans' interest rate and spread, at the 1st and 99th percentiles. We calculate the logarithms of financial variables—when used—by taking the natural logarithm of one plus the variable in question.

Finally, we set demand loans—which banks often report as having 100-year or longer tenors to distinguish them from others—to have a standardized tenor of one year.

Subsection A.3 Interest rates and spreads

To address issues with the quality of loans' reported interest rates and spreads, we take several steps: If a loan does not report an interest rate (or reports zero) at origination, we use the first reported interest rate for the loan in later quarters if it is available. We perform the same process for the bank's internal risk rating. Then, since the reported spread variable is often missing or unreliable, we manually calculate the spread by comparing the reported interest rate to that on a Treasury of similar maturity. Specifically, for floating-rate loans we subtract the rate on a Treasury of closest maturity on the last date of the quarter of origination from the reported interest rate. For fixed-rate loans we instead use the rate on a Treasury of closest maturity on the date of origination. We make this distinction because the reported interest rate on floating-rate loans will correspond to the reporting date (i.e., the end of the quarter) while the interest rate on fixed-rate loans will not vary over time, so the spread at origination must be calculated using a Treasury rate on the origination date. We obtain data on Treasury yields from the Federal Reserve's H.15 series. After constructing this new measure, we remove the small number of loans that have a negative spread.