Monetary Policy Exposure of Banks and Loan Contracting

JOB MARKET PAPER

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Abstract

It is well-documented that an increase in the Fed funds rate reduces the lending capacity of banks, which in turn induces banks to cut corporate lending. However, it is not clear how banks achieve this reduction towards their existing borrowers because outstanding long-term loans may limit their ability to do so. In this paper, I study how banks set loan contract terms to prepare for future contractionary monetary policy shocks. I find that banks with higher monetary policy exposure – banks whose lending capacity shrinks more during Fed hiking cycles – write loan contracts with stricter covenants. This ex-ante bank behavior makes borrowers more likely to violate covenants, giving banks the right to reduce lending ex-post when their lending capacity is hit by a monetary policy shock. These findings highlight the role of covenants in the transmission of monetary policy and imply that even firms with long-term loans remain exposed to monetary policy shocks.

Keywords: Financial intermediaries, Monetary policy transmission, Financial contracts, Loan covenants, Control rights, Industrial organization of banking

JEL Classification: E52, E58, G21, G32, K12, L16

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1 Introduction

Monetary policy is transmitted to the real economy through several channels. A well-documented one is the "bank lending" channel: an increase in the Federal (Fed) funds rate reduces banks' lending capacity, which, in turn, induces banks to cut corporate lending.[1] For instance, during a typical 400 basis points (bps) Fed hiking cycle, banks reduce lending by as much as 10 percent (Drechsler et al., 2017).[2] Banks can achieve this reduction by simply rejecting new loan applications (Jiménez et al., 2012). Alternatively, they may reduce the size of outstanding loans in their balance sheets if they have the flexibility to do so.

In this paper, I study how banks set loan contract terms in a way that would help them reduce lending to existing borrowers who have outstanding loan balances during times of monetary policy contractions. Theoretically, banks could prepare for future contractionary monetary policy shocks in two ways. One way is to write loan contracts with short maturities. This would allow banks to reduce lending by not renewing maturing loans to existing borrowers when their lending capacity is hit by a monetary policy shock. Another way to prepare is to write loan contracts with stricter covenants. This would make existing borrowers more likely to violate covenants, leading to more frequent contract renegotiations during which banks have the right to reduce lending. Which of these two ways prevails is an empirical question.

I find that the predominant way that banks prepare for future monetary policy shocks is by adjusting covenant strictness rather than loan maturity. In particular, banks that anticipate a larger decrease in their lending capacity during monetary policy contractions write loan contracts with stricter covenants. They do not shorten loan maturity, which is consistent with survey evidence indicating that firms may have a strong preference for long-term loans because of their operational needs and balance sheet structure (Graham and Harvey, 2001). Banks may also prefer issuing long-term loans with strict covenants over short-term loans because frequently evaluating all short-term borrowers could be costly. It is more efficient to only evaluate covenant violators, which are precisely the types of borrowers to which banks may want to reduce their exposure when their lending capacity is hit by a shock (Gertler and Gilchrist, 1994; Chodorow-Reich and Falato, 2017).

[1] See Blinder and Stiglitz (1983); Bernanke and Blinder (1988); Kashyap and Stein (1994); Van den Heuvel (2002).
[2] See Bernanke and Blinder (1992) for a similar magnitude of estimate.

To investigate how banks set loan contract terms when facing monetary policy shocks, I use DealScan data on commercial loan contract agreements and supplement it with two measures. The first measure is loan-level covenant strictness and reflects how likely a borrower is to violate the covenants of the loan contract during the life of the loan (Murfin, 2012; Demerjian and Owens, 2016). A stricter loan contract results in more renegotiations and, hence, provides lenders with greater flexibility to change the contract terms.[3] The second measure is bank-specific monetary policy exposure and captures how sensitive a bank's lending capacity is to changes in the Fed funds rate. Following Drechsler, Savov, and Schnabl (2017), I use the average deposit market power of a bank as a proxy for its monetary policy exposure. In particular, I calculate the monetary policy exposure of a bank by taking the weighted average of the deposit market concentrations of the counties in which the bank raises deposits.[4] The higher the deposit market power of a bank is, the larger the deposit outflow and the larger the decrease in its lending capacity will be during monetary policy contractions. Therefore, banks with a higher deposit market power have higher exposure to monetary policy.[5]

I find that banks at the 75$^{\text{th}}$ percentile of monetary policy exposure write 12 percent stricter covenants relative to banks at the 25$^{\text{th}}$ percentile. Stricter covenants lead to more covenant violations and, hence, contract renegotiations, thereby increasing the banks' ability to reduce lending when monetary policy shocks induce a contraction in their lending capacity. I find empirical evidence suggesting that banks indeed use covenant violations as an opportunity to reduce lending when needed. In particular, during times of monetary policy contractions, banks reduce lending to covenant violators but not non-violators. In contrast, during times of loose monetary policy, banks

[3] In this paper, I focus on financial covenants, which set the minimum thresholds for financial ratios that a borrower must satisfy. For instance, an interest coverage ratio covenant defines the minimum threshold for the ratio of EBITDA to interest expenses. This covenant requires the borrower to have an interest coverage ratio above this minimum threshold during the life of the loan contract. If the ratio falls below the threshold, a so called covenant violation occurs, and the control rights are transferred to the lender, indicating that the lender will have the right to change the contract terms, such as the right to reduce the loan amount. If the lender sets the minimum threshold at a higher value, the covenant is stricter.

[4] The county share of the total bank deposits is used as weights

[5] Larger deposit outflows from banks with a higher deposit market power are not inconsistent with profit-maximizing behavior by banks. According to the deposits channel proposed by Drechsler et al. 2017, banks exercise their deposit market power and pass only a fraction of the increase in the Fed funds rate onto their depositors. This results in an outflow of deposits from these banks, leading to a reduction in their lending capacity. However, the increase in the deposit spread (i.e., Fed funds rate minus deposit rate) easily offsets the deposit outflow. In other words, banks with a higher deposit market power cut their deposit supply more to maximize their deposit rent (deposit spread times deposit amount), similar to any monopolist.

do not enforce violated covenants. These findings highlight the role of covenants in the bank lending channel of monetary policy transmission and lend support to the hypothesis that banks use covenants as an ex-ante tool to gain flexibility for future monetary policy shocks.

However, to establish causality, two alternative explanations must be excluded. The first one is the endogenous matching of firms and banks along the dimension of unobserved firm characteristics. For instance, if risky firms are matched with banks that raise deposits in concentrated deposit markets, stricter financial covenants could reflect the firms' higher credit risks. I address this concern by employing two identification strategies. First, following Khwaja and Mian (2008), I perform a within-firm estimation using firm-year fixed effects. This estimation compares the covenant strictness of two loan contracts, each originated to a given firm within a year by two different banks. This within-firm estimation holds the firm credit risk fixed. Second, I use merger-induced variation in banks' monetary policy exposure in an instrumental variable (IV) setting. Following Garmaise and Moskowitz (2006)[6], I use the sample of counties in which the deposit market concentration increases following bank mergers. By using the deposit market shares of merging banks, I obtain a simulated bank monetary policy exposure variable to instrument actual bank monetary policy exposure. Both identification strategies produce results consistent with my main findings.

The second alternative explanation that needs to be ruled out is banks' loan market power. The deposit and loan market power of a bank may be correlated. Since I use banks' deposit market power as a proxy for their monetary policy exposure, the monetary policy exposure of a bank could also reflect its loan market power. Following the literature, I consider the following three potential sources of banks' loan market power in the syndicated loan market: bank industrial specialization (Paravisini et al., 2015), informational advantage (Berger et al., 2018; Schenone, 2009), and geographical specialization. My findings remain virtually unchanged when I control for these three potential sources in separate specifications. I do so by either using more granular fixed effects and additional control variables or constructing a revised monetary policy exposure variable that excludes the variation coming from the borrower's lending market conditions.

To provide additional evidence consistent with a causal interpretation of my findings, I test

[6]See also Scharfstein and Sunderam (2016), Favara and Giannetti (2017)

several cross-sectional implications of my hypothesis. The relationship between covenant strictness and banks' monetary policy exposure is more pronounced for long-term loans originated during times of high monetary policy uncertainty. This finding is consistent with banks' incentive to use covenants as a tool to gain flexibility against future monetary policy shocks. The longer the maturity of a loan, the higher the likelihood that banks experience a contraction in their lending capacity due to a monetary policy shock before the loan contract expires. Similarly, banks' need for flexibility to adjust their loan portfolio size should be more intense when uncertainty regarding the future path of the monetary policy rate is high.

The results across loan types provide further insight into the channel driving my results. The effect for lines of credit is stronger than that for term loans. It is critical for banks to have control over the size of their outstanding lines of credit loans because these loans are mostly held on their balance sheets. In contrast, term loans are often sold to institutional investors (Drucker and Puri, 2008; Gatev and Strahan, 2009; Irani and Meisenzahl, 2017). Furthermore, from the perspective of banks, lines of credit loans generate more liquidity risk since banks do not know the exact timing of loan withdrawals by their borrowers (Gatev and Strahan, 2009; Balasubramanyan et al., 2019). Therefore, banks have a greater incentive to gain flexibility to decrease the availability of these loans to their borrowers during monetary policy contractions.

Finally, why do firms accept stricter loan contracts even if their risks remain the same? One might expect firms to switch to another bank with lower monetary policy exposure to secure a loan with less strict covenants. However, switching to a new bank is costly for financially constrained firms that have limited outside options for external funding. This gives banks monopoly power over their customers and allows them to write stricter loan contracts without losing the customers to rival banks (Fama, 1985; Diamond, 1991; Petersen and Rajan, 1994; Drucker and Puri, 2008). Consistent with this argument, I find that the effect of bank monetary policy exposure on contract strictness is stronger among small firms with no credit rating. Furthermore, among firms with multiple lending relationships in a given year, banks with higher monetary policy exposure still write stricter covenants but charge lower loan spreads. This finding suggests that high-exposure banks are willing to leave money on the table in exchange for the flexibility provided by stricter covenants.[7]

This paper contributes to four strands of literature. The first contribution is to the extensive literature on the bank lending channel. The existing papers in this literature focus on banks' ex-post lending behavior, i.e., their behavior after a change in the Fed funds rate (Blinder and Stiglitz, 1983; Bernanke and Blinder, 1988, 1992; Kashyap and Stein, 1995, 2000; Kishan and Opiela, 2000; Drechsler et al., 2017). Instead, in this paper, I study the ex-ante behavior of banks that are exposed to future monetary policy shocks and show how this ex-ante behavior helps them respond to these shocks in the future.

The findings of this paper also link the literature on the bank lending channel to the literature on the simultaneous choice of loan contract terms (Billett et al., 2007; Bradley and Roberts, 2015; Green, 2018). Specifically, my findings emphasize the importance of considering all contract terms to better understand the transmission of monetary policy. Even if firms obtain long-term loans to avoid refinancing risk, banks can use stricter covenants to shorten the "effective" maturity of the loans they originate. This gives banks the flexibility to reduce their lending before the maturity date initially set in the loan contracts, suggesting that firms with long-term loans are still exposed to credit supply shocks induced by monetary policy.

This paper is related to a recent work by Chodorow-Reich and Falato (2017). They study the importance of covenant violations in the transmission of bank health to non-financial firms during the recent financial crisis. They document that financially unhealthy banks use covenant violations to decrease their lending to firms. Two points are noteworthy. First, their findings show that loan covenants are useful tools for banks to adjust their lending amount when necessary. My results complement theirs in that, given the usefulness of covenants, banks not only respond to covenant violations but also endogenously choose the probability of such violations by setting the strictness of covenants. Second, in Chodorow-Reich and Falato (2017), the source of variation in banks' lending behavior after a covenant violation is their financial health. However, in this paper, the driving force is banks' exposure to monetary policy. Banks that raise deposits in concentrated markets behave as a monopolist and optimally choose to reduce their deposit supply when the Fed funds rate rises.

[7] This result on loan spreads further rules out banks' loan market power as an explanation for my findings. If the driving force behind stricter loan contracts was banks' loan market power, we should not expect to find a negative effect on loan spreads.

These banks have good financial health but experience a contraction in their lending capacity due to their optimal behavior in the deposit market. I show that these banks write stricter covenants and gain flexibility to optimally adjust the size of their lending portfolio during monetary policy contractions.

Finally, I contribute to the literature studying the determinants of loan covenant strictness. The existing papers mainly focus on how borrower characteristics determine covenant strictness (Smith and Warner, 1979; Billett et al., 2007; Rauh and Sufi, 2010; Demiroglu and James, 2010). Murfin (2012) differs in that he studies the determinants of financial covenant strictness from a lender perspective. However, the mechanism underlying his results is still the performance of borrowers in the lender's loan portfolio. That is, banks begin writing stricter loan contracts as a result of a change in their perception of borrower risk.[8] My paper contributes to this borrower-centric literature by proposing a supply-side determinant of contract strictness. Independent of the riskiness of borrowers, banks set the strictness of covenants based on how sensitive their lending capacity is to changes in monetary policy.

In summary, I show that banks use loan covenants as an ex-ante tool to prepare for future monetary policy shocks. This ex-ante behavior helps banks reduce lending during monetary policy contractions. The findings highlight the role of covenants in the bank lending channel of monetary policy transmission and indicate that firms are exposed to policy shocks, even when they have long-term loans outstanding. Given how important access to bank lending is for firms, especially for small and opaque ones, the findings have potential implications for firms' liquidity management and investment policies.

The remainder of this paper is organized as follows. Section 2 describes the data sources, variables constructed, and relevant institutional details, along with the summary statistics. Section 3 provides the main results on the ex ante loan contracting behavior of banks based on their monetary policy exposure and supporting evidence from the ex post lending response of banks to monetary policy changes. Section 4 discusses two alternative explanations for my findings: banks' loan market power and endogenous bank-firm matching. Section 5 tests a number of cross-sectional implications to support the causal interpretation of the results. Section 6 concludes the paper.

[8] In particular, he documents that banks write stricter loan contracts when they update their perception of their own screening ability based on higher defaults of the borrowers in their loan portfolio.

2 Data and Institutional Background

The analysis in this paper relies on several data sources that cover the period from 1995 to 2013. In this section, I first provide information on the main data sources and the variables constructed with the necessary institutional details. Second, I present the summary statistics for the variables.

2.1 Data Sources and Variables

Loan-level data: The information on loan contracts is from Loan Pricing Corporation's (LPC) DealScan database. LPC collects the information from SEC filings and lead lenders and makes the data available on Wharton Research Data Services (WRDS). The dataset provides the name and location of the borrowing firm and the lenders for each loan, which I use to merge the DealScan loan data with other datasets. The dataset also provides detailed information on loan contract terms: loan amount, purpose, type, origination date, maturity, and – most important to my analysis – the types of financial covenants and their thresholds.

There are mainly two types of covenants in loan contract agreements: non-financial and financial covenants. Non-financial covenants determine the actions that a borrower cannot take, such as the sale of its assets. Compliance with these covenants is under borrower control, and violations of them are rare. In this paper, I focus on financial covenants, which set the minimum or maximum thresholds for financial ratios that the borrower must satisfy. For instance, an interest coverage ratio covenant defines the minimum threshold for the ratio of EBITDA to interest expenses. The violation of this financial covenant by the borrower (i.e., the borrower's actual financial ratio falling below the threshold set in the contract) transfers the control rights to the lender, which gives the lender the right to change the contract terms, for instance, the right to reduce the loan amount. Note that compliance with financial covenants is not directly under borrower control. Changes in economic conditions may trigger a financial covenant violation.

The literature mainly uses two types of measures to capture the strictness of a loan contract based on the financial covenants included in the contract. The first is based on the number of financial covenants. The measure can be either a count measure (i.e., the total number of covenants in a loan contract) or an index ranging on a given interval (e.g., the covenant intensity index proposed by Bradley and Roberts (2015)). Although the number of covenants is an important aspect of evaluating the strictness of a loan contract, these measures are not capable of reflecting the covenant slackness and the covariance between different financial ratios on which the covenants are based. To mitigate these concerns, Murfin (2012) develops a new covenant strictness measure that accounts for the number of covenants in a loan contract, the slackness of these covenants, and the covariation of the borrower financial ratios on which these covenants are written. By using the information on the thresholds of financial covenants from DealScan and the information on the actual level of borrower financial ratios at loan origination from Compustat, he calculates a loan-level measure of contract strictness that ranges from 0 to 1.[9] This measure captures the ex ante probability of covenant violation at loan origination. The closer the measure is to 1, the stricter the loan contract and the higher the probability that the borrowing firm will violate a financial covenant throughout the life of the loan contract. Stricter loan contracts therefore provide banks with greater flexibility to change the contract terms once the loan is originated. I use this contract strictness measure as my main dependent variable throughout the paper.

Branch-level deposit data: The Federal Deposit Insurance Corporation (FDIC) issues the Summary of Deposits (SOD) survey, which provides information on the deposits of U.S. bank branches at an annual frequency. The dataset has information on branch characteristics such as location and parent bank, which I use to merge deposit data with other datasets.

Using SOD data, I follow Drechsler et al. (2017) and calculate measures of deposit market concentration at two different levels: the county-year level and bank-year level. To compute the first, I sum the squared deposit market share of each bank that raises deposits in a county in a year. I refer to this county-year level variable as the county Herfindahl-Hirschman Index (county HHI). This variable is the county deposit market concentration and reflects how competitive the county deposit market is. Drechsler et al. (2017) show that county HHI captures the sensitivity of a bank's total deposits in that county to the changes in the Fed funds rate.[10] However, this variable does not reflect the overall deposit funding conditions of a given bank that raises deposits in the county because most banks in the U.S. collect deposits in more than one county and can reallocate

[9]With the same intuition, but with a slightly different non-parametric methodology, Demerjian and Owens (2016) calculate loan-level contract strictness and make it available on their website.

[10]See Section 3 for the discussion of why this is the case under the deposits channel framework of Drechsler et al. (2017).

deposits internally from one location to another to exploit lending opportunities. Therefore, to capture the deposit funding conditions of a given bank, I take the weighted average of the deposit market concentration of the counties in which the bank raises deposits, using the deposits of the bank in those counties as weights. Drechsler et al. (2017) show that this variable captures how sensitive a bank's total deposits, and hence its loan supply, is to the changes in the Fed funds rate. This bank-year level variable is the main variable of interest and is referred to as bank monetary policy exposure (bank MPE) throughout the paper.

Bank-level data: The bank-level data are from U.S. Consolidated Reports of Condition and Income filings (Call Report), submitted by banks regulated by the Federal Reserve System, the FDIC, and the Comptroller of the Currency. The data are available on WRDS.

I use bank balance sheets and income statements to construct a set of control variables. The bank equity ratio (bank equity normalized by bank assets) and bank size (log of bank assets) are two widely used variables in the literature on bank lending behavior. To further capture the differences among banks that may impact banks' lending practices, I also control for the following variables: the share of liquid assets (cash + securities) in total assets, the share of loans in total assets, the share of deposits in liabilities, the share of wholesale funding in liabilities, the average bank deposit rate, and bank profitability.

I aggregate bank-level data at the bank holding company level by using all subsidiary banks of a bank holding company. Both the banking industry practices and the data matching process necessitate the use of bank holding company-level data. First, the internal capital markets within a bank holding company imply that performing a bank holding company-level analysis is more consistent with the findings of the banking literature (Houston et al., 1997). Second, the information provided for lenders of loans in DealScan is more complete for the ultimate owner of the lender. Specifically, although some loan observations provide information on the immediate lender, which allows me to know both the subsidiary bank and its parent bank holding company, some loan observations report only the ultimate lender, in which case, I do not know the immediate lender (i.e., the subsidiary bank of the bank holding company).

Borrower-level data: Borrower characteristics and annual accounting information come from Compustat, which is available from the WRDS. Several borrower-level variables are used to control for the demand side of the loan market and for borrower quality. Among the variables used as borrower controls are borrower size (log of total assets), Tobin's q, the share of current assets in total assets, the share of tangible assets in total assets, leverage, fixed coverage ratio, and Altman's z-score. These variables are used widely in the literature and by banks to analyze a borrower before writing a loan contract. Furthermore, two credit rating dummies are also controlled for: one for whether a borrower has an S&P credit rating and one for whether the borrower has an investment-grade rating.

Macro data: The Fed funds target rate from Federal Reserve Economic Data (FRED) is used to measure the Fed's monetary policy stance. To measure monetary policy uncertainty in the U.S. economy, I use three different proxies. The first measure is the implied interest rate volatility from Cremers et al. (2017). Using the Treasury derivatives market, these authors calculate a five-year forward-looking implied interest rate volatility. Compared with historical interest rate volatility, this measure has the advantage of being forward-looking. Because I test whether a bank sets the strictness of a loan contract to affect the probability of future renegotiation of the contract depending on its exposure to monetary policy, the forward-looking measure of interest rate volatility better serves this purpose. The second measure is a newspaper-based index, constructed as a scaled frequency count of newspaper articles that discuss monetary policy uncertainty (Baker et al., 2016; Husted et al., 2017). As a final measure of monetary policy uncertainty, I use monetary policy shocks after FOMC meetings, defined in Gorodnichenko and Weber (2016), and take the average of the sizes of these shocks during the last twelve-month period. The larger the average size of the shocks is, the greater the monetary policy uncertainty in the market.

Other: Covenant violation data come from two different sources. First, based on a text-search algorithm, Nini et al. (2012) provide borrower-quarter-level information on whether a borrower is in violation of a loan contract covenant in a given quarter. Second, following Chava and Roberts (2008) and Chava et al. (2017), I determine whether a loan contract covenant is violated by comparing the actual borrower financial ratio to the financial ratio threshold set in the loan contract.

The list of bank mergers is provided by the Federal Reserve Bank of Chicago. Following the literature, I use only the mergers that do not involve FDIC assistance and that have a significant impact on county deposit market concentration, i.e., the banks involved in a merger constitute 10%

or more of the total county deposits.

2.2 Summary Statistics

The main sample that I use in my analysis consists of 7,765 loans with non-missing loan, borrower, and bank characteristics. I include only U.S. dollar-denominated loans to non-financial borrowers with a single lead lender in the loan syndicate. Figure 1 presents the time-series and cross-sectional variation of contract strictness. The average contract strictness measure reaches its highest value circa 2000 and then decreases until the financial crisis. Its mean value in the sample is 0.34. The measure also shows high cross-sectional variation throughout the sample period, with a standard deviation of 0.40.

The summary statistics for the remaining loan contract terms and borrower and bank characteristics are reported in three separate panels in Table 1: loan characteristics at the loan level in Panel A, borrower characteristics at the borrower-year level in Panel B, and bank characteristics at the bank-year level in Panel C. Because the main sample is obtained by matching several datasets, it is important to understand how the matching process affects the sample construction and what the resulting implications for my analysis. For this purpose, in each panel, I present the summary statistics for two different samples: one for a broader sample from the relevant dataset before the matching process (columns 1-2) and one for the main sample after matching (columns 3-7).

Panel A presents the summary statistics for loan characteristics. The average loan in the broader DealScan universe has a size of $291 million. Relative to this broader sample, the sample loans are larger in size and are originated to less risky borrowers (loans feature lower loan spreads and are less secured). Of the loans in the sample, 86 percent are lines of credit, also referred to as *revolving credit facilities*. Borrowers are able to draw funds against these credit facilities as long as they satisfy the conditions set in loan contracts, i.e., as long as they do not violate loan covenants. The average loan spread over LIBOR charged to borrowers is 167 basis points.

Panel B reports borrower characteristics for the sample at the borrower-year level. Consistent with Panel A, the matching process creates a sample containing borrowers that are larger than those in the universe of Compustat firms. Therefore, not surprisingly, the sample borrowers have higher leverage and hold less cash, and more of these borrowers have S&P credit ratings. However, the sample still features variation among borrowers. For instance, only 41 percent of borrowers in the sample have S&P ratings, implying that borrowers have different levels of bank-dependence/financial constraints.

Panel C presents the bank-year level summary statistics for banks. The average bank in the broader Call Report dataset has a size of $170 million and relies heavily on deposits for funding; the percentage of deposits in total liabilities is 95 percent. The main variable of interest, bank MPE, has an average value of 0.22 and shows variation comparable to other bank characteristics, with a standard deviation of 0.13. Consistent with the previous two panels, the banks in the main sample are larger ($55 billion vs. $170 million), use less deposits as a funding source (75% vs. 95%), and raise deposits in less concentrated deposit markets (bank MPE of 0.18 vs. 0.22) than those in the Call Report sample. This is mainly because the probability of matching large DealScan lenders with Call Report banks is higher as the information on those banks is more complete, which is consistent with the samples used in other studies that apply similar matching procedures (Schwert, 2018). Although the sample banks rely less on deposits and more on wholesale funding relative to a typical bank in the U.S., the fraction of deposits in their total liabilities is still sizable and constitutes the largest portion, and the loss of deposits in response to an increase in the Fed funds rate results in a strong loan contraction for these banks (Drechsler et al., 2017).

3 Baseline Specification and Main Results

In this section, I first provide a brief description of the underlying mechanism behind the deposits channel proposed by Drechsler, Savov, and Schnabl (2017) and define the monetary policy exposure of a bank in this framework. Then, by using my baseline specification, I test the main prediction of this paper: banks with higher monetary policy exposure write stricter loan covenants. Finally, I provide evidence on the ex post lending behavior of banks to support this prediction, namely, how stricter loan covenants help banks decrease their lending following an increase in the Fed funds rate.

Drechsler et al. (2017) present a model in which the deposit market power of banks drives changes in deposits and lending in response to monetary policy changes. These authors refer to this mechanism as the *deposits channel* and empirically show that it can account for the entire transmission of monetary policy through bank balance sheets. By using a structural estimation, Wang et al. (2018) also document findings consistent with the deposits channel of monetary policy. Specifically, Drechsler et al. (2017) provide a model in which households have a preference for liquidity, which is obtained by holding either cash or deposits. The opportunity cost of holding cash is the Fed funds rate, while that of holding deposits is the *deposit spread*, which is defined by the Fed funds rate minus the bank deposits rate. They show that banks use their market power to increase the deposit spreads that they charge their depositors in response to monetary policy tightening (i.e., by keeping their deposit rates low following Fed funds rate increases). This increase is possible because the opportunity cost of holding cash, the other alternative instrument for liquidity, increases; hence, banks do not lose deposits to cash. However, households respond by switching from holding liquid assets to holding illiquid assets, i.e., bonds, which leads to deposit outflows from banks. Because deposits are the largest and most stable funding source for banks, the banks that experience deposit outflows reduce their loan supply. They show that banks that raise deposits in more concentrated markets (i.e., banks with more deposit market power) increase their deposit spread more and experience larger deposit outflows. Therefore, these banks have greater exposure to monetary policy changes and reduce their commercial lending by more in response to monetary policy tightening.

3.1 Ex Ante Loan Contracting

Relying on the findings of Drechsler et al. (2017), the main question of this paper is whether banks take ex ante actions based on their exposure to monetary policy. In particular, do banks with higher monetary policy exposure include stricter financial covenants in their loan contracts? They may have an incentive to do so because stricter financial covenants may increase the probability of covenant violation and hence give these banks the necessary contractual rights following a covenant violation to reduce the loan amount if monetary policy tightens ex post. In other words, stricter financial covenants may provide banks with more bargaining power during the life of the loan contracts that they originate and thus the flexibility to reduce their lending amount in response to an increase in the Fed funds rate.

To test this prediction, I use the information on DealScan loan contracts and show that banks with greater exposure to monetary policy write stricter loan contracts relative to banks with less exposure. Specifically, I begin the sample construction with loan-level strictness data (Demerjian and Owens, 2016). Then, by using unique loan ID, I complement the strictness data with other loan contract terms and the identity of the lead lender and borrower provided in the DealScan data. I manually match lead lenders in DealScan with commercial banks in the SOD and Call Reports based on their names and locations, which enables me to obtain my main variable of interest – bank-year-level monetary policy exposure – and to use bank balance sheet information to control for lender characteristics that may affect loan outcomes. Finally, to better control for borrower characteristics, I obtain Compustat data by using the borrower link file constructed by Chava and Roberts (2008).

My baseline specification controls for observable borrower, bank, and loan characteristics, unobservable time-invariant borrower and bank characteristics and, finally, economy-wide macroeconomic shocks. Formally, I estimate the following loan-level regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_t + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t} \tag{1}$$

where $Strictness_{\ell,f,b,t}$ is the covenant strictness of loan contract l originated by bank b to borrower f during year t; $MPE_{b,t-1}$ is the bank-level lagged monetary policy exposure of bank b; α_f, η_b, and δ_t are borrower, bank, and year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, borrower, and loan control variables, respectively. The coefficient of interest is β, which is expected to take a positive sign. For ease of interpretation, all variables are standardized, i.e., β shows the impact of a one-standard-deviation increase in bank MPE on covenant strictness. Because our variable of interest, $MPE_{b,t-1}$, is constant across loans originated by a bank in a given year and because the loan contracting practices of different banks may be correlated across the loans they originate to a given borrower, the standard errors are two-way clustered at the bank and borrower levels for each regression.

Table 2 presents the results. Columns (1) through (5) use my main sample with 7,765 loan observations. The specification in column (1) has only year fixed effects, with no bank or firm controls other than the S&P credit rating dummies for firms, and hence, it uses cross-sectional variation in bank MPE. Other loan contract terms are also excluded due to the 'bad control' problem, as they may be determined simultaneously with the covenant strictness. The coefficient on bank MPE is positive and significant. The economic meaning of this coefficient is that a one-standard-deviation increase in the monetary policy exposure of a bank increases loan contract strictness by 12 percent at the mean value of the strictness measure.[11]

In column (2), I include firm and bank fixed effects to control for time-invariant differences among firms and banks. Both the size and statistical significance of the coefficient increase. In column (3), I saturate the model with firm controls: firm size, Tobin's q, and leverage. In column (4), I also include bank control variables that are used in the bank lending literature: bank size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, the share of deposits in liabilities, and the share of wholesale funding in liabilities. The specification in column (5) further controls for loan characteristics: loan purpose, loan type, loan size, and loan maturity. The magnitude of the coefficients in columns (3) through (5) is similar to that in column (2). In the last two columns of the table, I restrict the sample by excluding loan observations with missing information on additional firm controls: the current ratio, tangible asset ratio, Altman's z-score, and fixed coverage ratio. For this restricted sample, I first present the result of the regression without including these additional controls. Then, I add these controls. The coefficient on the main variable of interest does not change in either case.

There are two points to emphasize regarding the results in Table 2. First, the coefficients of the borrower-level variables all have the predicted signs (Demiroglu and James, 2010) and are statistically significant except for tangibility. Large borrowers that have low leverage with better investment opportunities obtain loan contracts with less strict covenants. Furthermore, as the share of a borrower's liquid assets in its balance sheet increases, as the borrower's income increases relative to its interest expenses, and as the borrower becomes less likely to go bankrupt, it obtain loans with less strict covenants. Second, while including firm and bank fixed effects increases the size of the main coefficient, including time-varying firm and bank controls does not have a meaningful impact on its size, which suggests that the nature of any potential omitted firm characteristic that may be correlated with contract strictness and bank MPE is time invariant, which is consistent with the

[11] $0.04/0.34 = 12\%$

finding in the literature that bank-firm relationships are sticky due to the cost of switching across banks. Thus, once the time-invariant firm and bank characteristics are controlled for, the monetary policy exposure of the bank with which a borrower works is orthogonal to borrower characteristics and hence mitigates the concern about endogenous matching of borrowers and banks along the dimensions of borrower credit risk. Section 4.2 more formally addresses the concerns on omitted time-varying firm characteristics.

The results in the table are robust to including loans with multiple lead lenders in the syndicate (Table A1), restricting the sample to the pre-crisis period (Table A2), and using an alternative measure for banks' monetary policy exposure (Table A3).

The other alternative to gain flexibility for a potential monetary policy change in the future would be to originate short-term loans instead of long-term loans. Instead of writing loan contracts with strict covenants to increase the probability of contract renegotiation, banks may gain the same flexibility for future contingencies by writing short-term loan contracts. Using the same regression specification as in Equation (1) but with loan maturity as the dependent variable, I find no evidence for this (Table 3), which is is partly and possibly a result of the specific nature of the loan market that I study. The majority of loans in DealScan data have long maturities and show little variation[12] (Almeida et al., 2011; Chodorow-Reich and Falato, 2017). Within this class of loan contracts, financial covenants grant banks the necessary contractual right to gain flexibility for future contingencies. Furthermore, there are two additional points worth noting. First, the maturity choices of firms are to a large extent dictated by their operational needs and balance sheet structure (Graham and Harvey, 2001). Therefore, they may have a strong preference against having short-term loans and may not show flexibility on maturity dimension. Second, loan underwriting is a costly process for both borrowers and banks, especially in the syndicated loan market. Banks may, therefore, prefer long-maturity loans combined with strict covenants to short-maturity loans due to these cost concerns. Instead of evaluating borrowers with short-maturity loans on a frequent basis to make a lending decision, it is more cost-efficient to evaluate only the covenant violators. This is because violators are exactly the types of borrowers that banks may want to reduce their lending when their lending capacity is hit by a shock (Gertler and Gilchrist, 1994; Chodorow-Reich

[12] In my main sample, loan maturity has a median value of 4.8 years and an interquartile range of 3-5 years.

and Falato, 2017). Overall, the cost of writing loan contracts with 'short maturity/strict covenants' and renewing the loans each time 'at expiration/upon covenant violation' should be weighed against the benefit of having flexibility for future monetary policy contingencies.

3.2 Ex Post Lending Response

In the previous subsection, I document that banks with higher monetary policy exposure include stricter financial covenants in their loan contracts. To interpret this as banks gaining flexibility to reduce their lending amount following an increase in the Fed funds rate, the relevant question in this subsection is whether banks with higher monetary policy exposure indeed use stricter financial covenants as a tool to decrease their loan supply following an increase in the Fed funds rate. In other words, do ex ante loan contracting practices (i.e., writing stricter financial covenants) result in a consistent ex post bank lending response (i.e., decreasing loan supply following monetary policy tightening)? To show that this is indeed the case, I test the following two questions. First, do stricter loan covenants result in more covenant violations? Second, following an increase in the Fed funds rate, do banks with higher monetary policy exposure decrease their lending by more following a covenant violation? Each question is answered in the affirmative.

The first test is in fact a validation of the predictive power of loan contract strictness for actual covenant violations. Because covenant violations transfer control rights to lenders, this test answers the question of whether writing stricter loan contracts grants lenders more contractual control power over their borrowers to change loan contract terms. This finding is important in the sense that it reveals the relevance of contract strictness as a decision variable for banks and mitigates the concern that borrowers may accept stricter covenants if they anticipate that they will not violate the covenants and believe that stricter covenants are not binding. I estimate the following loan-level regression model for the test:

$$Violation_{\ell,f,b,t} = \beta Strictness_{\ell,f,b,t} + \delta_t + \psi_{ind} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t} \tag{2}$$

where $Violation_{\ell,f,b,t}$ is a dummy variable that takes value 1 if a covenant of loan contract l originated by bank b to borrower f during year t is violated at any time during the life of the loan contract; $Strictness_{\ell,f,b,t}$ is the strictness of the same loan contract at origination; δ_t and ψ_{ind} are year and industry fixed effects, respectively; and $\mathbf{F}_{f,t-1}$ and $\mathbf{L}_{\ell,f,b,t}$ are borrower and loan control variables, respectively. The coefficient of interest is β, which is expected to take a positive sign.

Because DealScan provides information on loan contracts only at origination, I follow two different strategies to determine whether a loan covenant is violated during the life of the loan contract and show that the results are robust. First, I use the covenant violation data provided by Nini et al. (2012), who employ a text-search algorithm to SEC filings to determine whether a borrower is in violation of a loan covenant in a quarter. This algorithm does not specify which specific loan contract is violated. Therefore, as a proxy, I assume that any loan contract that is effective during the violation quarter is violated. For instance, if a borrower is in violation of a covenant in the last quarter of 2001 based on SEC filings, I examine the outstanding loan contracts in that quarter and assume that their covenants are violated. Second, following Chava and Roberts (2008) and Chava et al. (2017), I use the accounting information from Compustat and covenant threshold information from DealScan to determine whether a borrower's actual financial ratio is above or below the covenant threshold set in the loan contract.[13] For instance, if the actual current ratio of a borrower falls below the current ratio threshold set in the loan contract, this represents a covenant violation. Table 4 presents the results. OLS and probit regressions with different controls across two different datasets provide consistent results and imply that stricter loan contracts result in more violations. The economic meaning of the coefficient is that a one-standard-deviation increase in covenant strictness increases covenant violation by 7%, which represents a 22% increase in violation probability at its mean value[14].

I provide the results of the second test in two steps. First, without any reference to covenant violations, I validate whether the bank-level monetary policy exposure variable measures what it is supposed to measure: do banks that raise deposits in concentrated markets decrease their lending more following an increase in the Fed funds rate? This is in fact the verification of the deposits channel defined by Drechsler et al. (2017). To conduct this analysis, I use the annual total outstanding loan amount between a borrower and its lender as the dependent variable. Unlike

[13] I am grateful to Sudheer Chava, Vikram Nanda, and Steven Chong Xiao for sharing the code to implement this strategy.

[14] 0.07/0.32=22%

credit registry data, however, DealScan reports flow data and provides information on loans only at their origination; hence, I do not directly observe the outstanding loan amount between a borrower and its lender over time. I follow the literature (Lin and Paravisini, 2013; Gomez et al., 2016; Chakraborty et al., 2018) and construct the annual outstanding loan amount between a borrower and its lender from DealScan by using the information on loan origination date, termination date, and loan amount. Furthermore, I update the termination date of a loan contract if there is a new refinancing loan contract of the same type before the expiration date of the former (Chava and Roberts, 2008; Chava et al., 2017). I supplement this annual borrower-bank-level outstanding loan data with the annual bank-level MPE variable. I add to these data the bank balance sheet information to control for lender characteristics that may affect loan outcomes. Finally, I merge the data with the annual Fed funds rate. With these data, I follow Khwaja and Mian (2008) and implement a within-borrower estimation. In particular, I use borrower-year fixed effects and compare the outstanding loan amounts in a given year between a borrower and its lenders with different levels of monetary policy exposure. To conduct this within-borrower estimation, I use only the sample of borrowers that work with at least two banks in a given year and exclude all others because the coefficient is not identified for single-bank borrowers. By assuming that borrower loan demand is symmetric across different banks, this empirical strategy allows for time-varying differences among borrowers and holds loan demand fixed, hence allowing me to uncover the effect of bank MPE on loan supply.[15] Formally, I estimate the following regression model[16]:

$$log(loan)_{f,b,t} = \beta(MPE_{b,t-1} \times \Delta ff_t) + \mu BankControls_{b,t-1} + \theta_{f,t} + \eta_b + \epsilon_{f,b,t} \tag{3}$$

where the dependent variable is the log of the outstanding loan amount between bank b and borrower f in year t, $MPE_{b,t-1}$ is the bank-level monetary policy exposure of bank b in year $t-1$, Δff_t is the

[15]To test the prediction of the deposits channel on commercial lending, Drechsler et al. (2017) use annual bank-county-level data from the Community Reinvestment Act (CRA). To keep loan demand constant, they include county-year fixed effects in their regressions and hence compare the commercial lending of different banks within a given county. To the extent that borrower clientele is homogeneous across banks, this strategy controls for loan demand. However, if changes in monetary policy asymmetrically affect the loan demand of borrowers across different banks, this strategy fails to measure the loan supply effect. Since the deposits channel is at the center of my empirical setting, I verify the commercial lending part of the deposits channel by analyzing ex post bank lending behavior in response to monetary policy changes by using more granular data and empirical strategy than those in Drechsler et al. (2017).

[16]Examples of Khwaja and Mian (2008) strategy include Jiménez et al. (2014) and Amiti and Weinstein (2018).

change in the Fed funds rate from year $t-1$ to t, $\theta_{f,t}$ are borrower-year fixed effects for borrower f, and η_b are bank fixed effects for bank b. Across different specifications, I also control for bank size, equity ratio, liquidity ratio, profitability, average deposit rate, share of loans in total assets, and share of deposits and wholesale funding in total liabilities. The coefficient of interest is β, which is expected to take a negative sign. I double cluster standard errors at the bank and borrower levels.

Table 5 presents the results. Each specification in the table uses the within-borrower sample: the sample of borrowers that have outstanding loans from at least two banks in a given year. For comparison, in columns (1) and (2), I first run the specification without borrower-year fixed effects. Column (1) shows a negative and significant coefficient for the interaction term, meaning that, in response to an increase in the Fed funds rate, banks that collect deposits in more concentrated deposit markets reduce their commercial lending relative to banks that collect deposits in less concentrated deposit markets and therefore are more exposed to monetary policy. In column (2), I saturate the model with the interactions of the change in the Fed funds rate and other bank characteristics that are widely used in the bank lending literature to control for the variation in bank-level financial constraints: bank size, equity ratio, and liquidity ratio. Two observations are noteworthy. First, the magnitude and statistical significance of the coefficient increase relative to column (1), thereby again verifying the deposits channel of monetary policy. Second, the signs of interaction terms with bank size and equity are consistent with the findings in the literature, with only the interaction for the size being statistically significant and that for the equity ratio being slightly insignificant (Kashyap and Stein, 1995, 2000; Kishan and Opiela, 2000). In columns (3) and (4), I replicate the specifications in the first two columns but drop borrower and year fixed effects and instead use borrower-year fixed effects, which allows me to perform the within-borrower estimation specified in Equation (3). The coefficient that measures the deposits channel remains significant. The economic meaning of this coefficient is that a one-standard-deviation increase in bank MPE reduces commercial lending by approximately 2 percent per 100 bps increase in the Fed funds rate, which is consistent with the findings of Drechsler et al. (2017). As a result, the findings in Table 5 verify that the deposits channel proposed by Drechsler et al. (2017) is robust to using more granular data and a more endogeneity-proof empirical strategy.

However, the decrease in the loan supply following a Fed funds rate increase may not follow a covenant violation. Banks may also decrease their total lending by not renewing loans at the expiration date of the existing loan contract agreements. To test whether banks with higher monetary policy exposure decrease their lending by more in response to a covenant violation during monetary policy tightening, I take the findings in Table 5 a step further. Specifically, in column (1) of Table 6, I further interact the main interaction variable with a dummy variable that takes a value of 1 if a refinancing loan contract replaces an existing loan contract agreement during the year. Thus, while the main interaction term shows how banks with higher bank MPE react to an increase in the Fed funds rate in the absence of a refinancing loan, the double interaction term shows how these banks react to an increase in the Fed funds rate when there is a refinancing loan in that year relative to the base case. Because a refinancing loan may proxy for renegotiation between a borrower and its lender, a negative coefficient on the double interaction term would suggest that the reduction in bank lending occurs after a covenant violation, which entails a contract renegotiation. The first column does not confirm this. However, in column (2), I create separate interaction terms for term loans and lines of credit and report several coefficients with their significance levels at the bottom of the table. An interesting pattern emerges. Following a Fed funds rate increase, while the banks with higher monetary policy exposure decrease their supply of term loans in the absence of refinancing activity but not in the case of refinancing, the opposite is true for lines of credit. For lines of credit, the reduction in the loan supply by banks with higher monetary policy exposure occurs after a refinancing activity during periods of monetary policy tightening.

An important caveat regarding the previous analysis is that the refinancing dummy may not be a good proxy for contract renegotiation after a covenant violation. To mitigate this concern, in columns (3) and (4), I use the covenant violation data provided by Nini et al. (2012).[17] Column (3) shows that, following a Fed funds rate increase, there is no difference between the lending behavior of banks with low and high monetary policy exposure unless the borrower violates a covenant throughout the year. In the case of a violation, however, banks with greater exposure to monetary policy decrease their loan supply by more. Column (4) shows the effect separately for term loans and lines of credit. The effect is negative and significant only for lines of credit.

[17] This violation dataset is also not perfect for my purposes because it does not specify which specific loan contract is violated. It indicates only whether a firm is in violation of a loan contract during a quarter. However, given cross-violation clauses in loan contract agreements, this may not be an important concern.

As a result, the two pieces of ex post evidence in this section support the main finding of this paper: banks with higher monetary policy exposure write stricter financial covenants when they originate loans. These stricter covenants result in more covenant violations, which allow banks to decrease their loan supply to their borrowers following an increase in the Fed funds rate.

4 Alternative Explanations

In this section, I discuss two alternative explanations of my findings. One alternative explanation is that the bank MPE measure may capture the loan market power of a bank instead of its exposure to monetary policy changes. The other explanation is the sorting between borrowers and banks based on unobserved borrower characteristics, such as credit risk. I provide several tests to refute each of these potential explanations.

4.1 Loan Market Power

Relying on Drechsler et al. (2017), the monetary policy exposure of a bank in this paper is defined as the weighted average of the deposit market concentration of the counties in which a bank raises deposits. Because the market power of a bank in deposit and lending markets may be correlated, bank MPE may also reflect the overall loan market power of the bank, hence capturing the variation in lending conditions in addition to variation in deposit market conditions. Therefore, it is important to control for the loan market power of a bank when measuring the impact of its MPE on the strictness of a loan contract it originates.

A bank's loan market power can come from many sources. Banks may exercise market power in their lending behavior as a result of their industrial specialization, geographical specialization, or informational advantage. The relevant source of market power for a specific bank may vary depending on the specific loan market in question. For instance, while the geographical specialization of a bank may be an important determinant of its loan market power in originating small business loans in a local economy, its industrial specialization and information advantage due to a long-term lending relationship may be more important in originating large loans in the syndicated loan market. Throughout the analysis in this section, I remain agnostic on the source of banks' loan market power and test whether my main findings survive after controlling for the loan market power of banks arising from these three potential sources.

A bank may have loan market power in a specific industry because of its past experience or informational advantage in that industry (Paravisini et al., 2015). The specifications in Table 7 control for banks' loan market power due to their specialization in specific industries. For comparison purposes, column (1) replicates my baseline specification with year, bank, and firm fixed effects and control variables (i.e., column (5) of Table 2).[18] In columns (2) through (4), I control for loan market concentration in a given industry by including loan market HHI in that industry. I do so by using the syndicated loan market shares of banks in a given industry, where the industries are defined based on different industry classifications: 1-digit SIC codes, Fama-French 10 industries, and Fama-French 48 industries. The coefficient on my main variable of interest does not change. The coefficient on loan market concentration is positive and significant only for Fama-French 48 industry classifications. In columns (5) through (7), I drop year fixed effects and instead use industry-year fixed effects, again using several industry classifications for robustness. Thus I compare borrowers that operate in the same industry. This specification controls for the time-varying characteristics of a given industry, including changes in the industry's loan market concentration, which means that the coefficients for industry loan market concentration are not identified. As an additional control for industry-level loan market power, I add the loan market share of the lead lenders in the borrower's industry. The coefficient of interest remains the same, and the coefficient on the loan market share variable is significant and takes the predicted positive sign (for the FF-10 industry classification).

A large body of literature documents the informational advantage of banks due to their long-term relationships with their borrowers (Berger et al., 2018; Schenone, 2009). This advantage may give banks monopoly power in their lending practices, which may allow banks to include stricter financial covenants in their loan contracts. In column (1) of Table 8, instead of borrower and bank fixed effects, I use borrower-bank fixed effects. This specification allows me to control for the time-invariant lending relationship for a given borrower-bank pair and measure the effect of a change

[18] In fact, if the relevant loan market for syndicated loans is the entire U.S., i.e., there is no specialization of banks in a specific industry or geographic location, then the year fixed effects in column (1) control for the variation in loan market concentration over time.

in bank MPE over time on loan contract strictness. The coefficient of interest does not change. In the remaining columns, I add various time-varying relationship lending proxies that are used in the literature. I measure the relationship intensity between a borrower and its current lead lender in a loan contract by the total amount of loans that the borrower has drawn from this lender as a percentage of the total amount of loans it has drawn so far (Schenone, 2009). This measure reflects how dependent a borrower is on its current lead lender. Column (2) reports a positive and significant coefficient for this variable, suggesting that the more locked in the borrower is with its current lender, the more bargaining power the lender has in its loan contracting practices. The addition of this variable, however, does not change the coefficient on bank MPE. In column (3), as an additional control, I include relationship duration, which is defined as the number of years the firm has had a lending relationship with its current lender (Ongena and Smith, 2001). The results do not change. Finally, in the last column, I include several additional dummies: "switched lender," a dummy that indicates whether the firm starts a new lending relationship with a lender that it has never worked with; "immediate prior lender," a dummy that indicates whether the firm maintains the immediate previous lead lender in the current loan contract; and "first loan," a dummy that indicates whether a loan is the first loan observed for the borrower in the DealScan data. The coefficient on the bank MPE variable is robust to the inclusion of these dummies.

Finally, to the extent that local lending conditions are important for a borrower and correlated with local deposit market conditions, the variation in bank MPE may reflect local lending conditions rather than the monetary policy exposure of the lender. Note that the relevant monetary policy exposure measure in my analysis is at the bank-year level, i.e., I calculate the overall monetary policy exposure of a bank by taking the weighted average of the deposit market concentration of the counties in which a bank raises deposits. Thus, the relevant variable is not the monetary policy exposure of the bank's branch in the county where the borrower is located. This is because banks can reallocate deposits they collect from one branch to another branch in order to exploit lending opportunities. Therefore, the bank-year level monetary policy exposure measure reflects the bank's overall exposure to changes in monetary policy. This indicates that the changes in the lending conditions of the county where a borrower is located may have a limited impact on the changes in the bank's overall monetary policy exposure because the bank's deposits in the borrower's county constitute only a small portion of the bank's total deposits. However, to further mitigate this concern, I follow two different empirical strategies in Table 9. First, in columns (1) and (2), in addition to industry-year fixed effects, I include state-year and county-year fixed effects, respectively, which means that I compare the loan contract strictness of borrowers that are located in the same county[19] but work with banks with different levels of monetary policy exposure. This within-county comparison controls for changes in local loan market conditions. The coefficient of bank MPE remains positive and significant. Second, in columns (3) through (5), I exploit the source of variation in bank MPE. For instance, in column (3), I use the variation in bank MPE that comes from counties other than the borrower's own county. Specifically, I calculate a new borrower's county-specific measure for bank monetary policy exposure by excluding the deposit market of the borrower's own county. Note that unlike the bank-year level bank MPE, the new measure is at the bank-county-year level, which means that the specification in this column uses only the variation in a bank's overall monetary policy exposure from counties other than the borrower's own county. The coefficient does not change. In column (4), I restrict the sample to banks with limited presence in their borrowers' counties. Specifically, I exclude observations from the sample for which the deposits of the bank in the borrower's county constitute more than 1 percent of the bank's total deposits. In column (5), I rely on a stricter criterion and use only those observations for which the bank has no presence in the borrower's county deposit market. Although these two criteria considerably reduce the sample size, the size of the main coefficient does not change significantly.

4.2 Sorting between Firms and Banks: Credit Risk

While the main results are robust to various controls, fixed effects, and controlling for bank loan market power, the remaining identification challenge is the endogenous sorting between borrowers and banks based on an unobserved borrower characteristic. To obtain a causal interpretation of the coefficients, the sorting between borrowers and banks should be as good as random, which means that borrowers of high-exposure banks should not differ systematically from borrowers of low-exposure banks along dimensions related to borrower risk. If risky borrowers work with banks that have high exposure to monetary policy, stricter financial covenants would reflect the riskiness of

[19] In the same state in column (1).

these borrowers - not the monetary policy exposure of banks. For instance, an omitted variable may trigger an increase in both borrower credit risk and bank MPE, which induces banks to write stricter loan contracts to control borrower credit risk. To address this concern and establish the causal relation from bank MPE to contract strictness, I implement two additional empirical approaches in this section.

4.2.1 Within-firm Estimation

First, I perform a within-borrower estimation (a la Khwaja and Mian 2008). Within-borrower estimation uses borrower-year fixed effects and compares the strictness of loan contracts originated to the same borrower in the same year by banks with different levels of monetary policy exposure. Under the assumption that borrower riskiness remains constant throughout the year and hence that the terms of loans originated in the same year reflect the same level of borrower riskiness, this estimation controls for endogenous borrower-bank matching based on borrower riskiness. The regression model used in this estimation strategy is as follows:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \xi_{f,t} + \eta_b + \Gamma \mathbf{B}_{b,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t} \tag{4}$$

where $\xi_{f,t}$ are borrower-year fixed effects for borrower f. Conducting this within-borrower estimation requires me to use only the sample of borrowers that have new loan originations from at least two banks in a given year and exclude all others because the coefficient is not identified for single-bank borrowers. However, the number of such borrowers in DealScan is limited, reducing the sample size to 250, which makes inference more difficult. To overcome this problem, I implement two separate modified within-borrower estimation models in Equation (4) and present results consistent in both cases with the results of my baseline specification – the estimation in Equation (1).

The first modified model changes the assumption that the terms of a loan contract reflect the riskiness of a borrower only in the loan origination year. I assume that loan terms reflect the riskiness of the borrower for all years from the loan origination year until the loan expiration year. In practice, this means that instead of only comparing two loans originated to a borrower by two banks in the same year, I can compare two loans that are outstanding in the same year even if their origination years differ. For instance, if there is a three-year loan that is originated in 2001, then I use three data points for this loan: one each for 2001, 2002, and 2003, which allows me to compare this loan with a loan originated in 2002. This modification increases the sample size from 250 to 3,065.

The second modified model does not require changes to the assumptions but regards only the definition of *year*. Note that the time frame used in Equation (4) is a calendar year. Thus, the estimation compares only the loans originated within the same calendar year regardless of the time distance between the origination date of the loans. For instance, consider the following two cases. In the first case, assume that a borrower obtains a loan from a bank in December of year t and a new loan from another bank in January of year $t+1$. The within-borrower estimation in Equation (4) does not use these two loan observations in the estimation. In the second case, assume that the borrower secures a loan that is originated in February of year t and another loan that is originated in November of the same year. These two loan observations are used in the within-borrower estimation. Note that although the time distance between the origination dates of loans is shorter in the first case, these two observations are not included in the sample simply because they are in different calendar years. However, as the time distance between two loans decreases, we should expect the two loans to reflect a more similar level of borrower riskiness. To avoid losing these observations from my within-borrower sample, I use a moving four-quarter window as a year instead of using a fixed calendar year. I refer to this new four-quarter moving window as the period throughout the paper. For instance, 1995:Q1–1995:Q4 is the first four-quarter period in my sample, 1995:Q2–1996:Q1 is the second period, 1995:Q3–1996:Q2 is the third period, and so forth. With this new "period" definition, I use the following modified within-borrower estimation model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \xi_{f,p} + \delta_t + \eta_b + \Gamma \mathbf{B}_{b,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t} \tag{5}$$

where $\xi_{f,p}$ are borrower-period fixed effects. Note that in this modified within-borrower estimation, $\xi_{f,p}$ replaces $\xi_{f,t}$. I also include calendar-year fixed effects, δ_t, to control for any calendar-year-specific shocks or regulations. This modification increases the sample size from 250 to 557. With the borrower-period fixed effects, I compare the strictness of loan contracts originated to the same borrower in the same period (i.e., four-quarter period) by banks with different levels of monetary policy exposure. Because the borrower of these loans is constant in this comparison, this strategy holds borrower riskiness constant and enables me to reveal the effect of bank MPE on contract strictness.

Table 10 reports the results of the first modified within-borrower estimation using the within-borrower sample: the sample of borrowers that have outstanding loans from at least two banks in a given year. To provide a comparison for the results in Table 2, I run the specification without borrower-year fixed effects in columns (1) through (3). Specifically, column (1) uses borrower, bank, and year fixed effects and borrower control variables. Columns (2) and (3) add bank and loan controls, respectively. The coefficients are consistent with those I obtain for the full sample. In columns (4) through (6), I drop borrower and year fixed effects and instead use borrower-year fixed effects. Note that I also drop borrower controls because they are not identified in a regression with borrower-year fixed effects. The coefficient that measures the effect of bank MPE on contract strictness remains significant.

Table 11 reports the results of the second modified within-borrower estimation using the within-borrower sample: the sample of borrowers that have new loan originations from at least two banks in a given period. The panel estimations in columns (1) through (3) produce results consistent with the previous estimations. In columns (4) through (6), I drop borrower fixed effects and instead use borrower-period fixed effects. The effect of bank MPE on contract strictness remains positive and significant.

Note that for within-borrower estimations, by construction, I use only the borrowers that have more than one lending relationship in a given year, which raises the question of why a borrower accepts a stricter loan contract even if it has more than one relationship. A potential explanation for these types of borrowers is that the bank may offer a lower loan spread in return for stricter covenants. To test this possibility, I conduct the same within-borrower estimations by replacing loan strictness with loan spread as the dependent variable. Table 12 shows that banks with higher monetary policy exposure charge lower loan spreads. This means that banks gain flexibility by writing stricter loan contracts for future contingencies, but in return, they offer more favorable interest rates to their borrowers. Furthermore, the results on loan spread also mitigate the concern that loan market power of banks, instead of their exposure to monetary policy, may drive the results.

If the driver of stricter loan contracts was banks' loan market power, we should expect to also find a positive effect on the loan spread.

4.2.2 Bank Mergers

The second way to address concerns about endogenous borrower-bank matching is to use merger-induced variation in banks' monetary policy exposure. Following Garmaise and Moskowitz (2006), Favara and Giannetti (2017), and Scharfstein and Sunderam (2016), I use the sample of counties in which deposit market concentration is increased by bank mergers. Specifically, first, by using the deposit market shares of merging banks in those counties, I calculate simulated HHI of the counties. The deposit market shares of non-merging banks in those counties are considered to be zero in the calculation of simulated county HHI. Second, following the same procedure used previously for bank MPE, I calculate a simulated bank MPE by taking the weighted average of the simulated HHI of counties in which a bank raises deposits. I use this simulated bank MPE in an IV framework as an instrument for bank MPE.

Table 13 presents the results of this IV estimation. The first column shows the first stage, in which I regress bank MPE on simulated bank MPE. The coefficient is significant and has the predicted sign, and the F statistics of the first stage is above 10. Note that I use bank and year fixed effects, which means that the variation in monetary policy exposure is within a bank after the merger relative to other banks that do not experience a merger. The second column shows the IV estimation results. Consistent with my previous results, the coefficient of bank MPE remains positive and significant. The size of the coefficient is larger than that of my baseline specification and is close to the estimate that I obtain by using a within-borrower estimation.

Taken together, various controls and different empirical strategies produce results consistent with my baseline specification and ensure that the impact of monetary policy exposure on the lending behavior of banks does not reflect banks' loan market power or sorting of borrowers and lenders based on an omitted variable.

5 Heterogeneity

After ruling out alternative explanations, in this section, I test a number of cross-sectional implications of my hypothesis to support a causal interpretation of the results: it is the increase in the monetary policy exposure of banks that drives the increase in loan contract strictness.

The first heterogeneity test relates to banks' incentives to gain flexibility to adjust the size of their loan portfolio. The intuition behind my interpretation of the results is banks' concern about the future path of the Fed funds rate. Therefore, banks are in greater need of flexibility to adjust their loan portfolio size when there is greater uncertainty about the future path of monetary policy, which implies that I should find a stronger link between the monetary policy exposure of banks and loan contract strictness during periods of high monetary policy uncertainty. I use three different measures of this uncertainty. The first measure is implied interest rate volatility, which is obtained from future contracts on interest rates (Cremers et al., 2017). The second measure is the monetary policy uncertainty index. This index is a newspaper-based index and is widely used in the literature (Baker et al., 2016; Husted et al., 2017). The third measure captures recent monetary policy shocks. Specifically, I obtain the size of the monetary policy shocks in the last one-year period from Gorodnichenko and Weber (2016) and and take their average to obtain a proxy for monetary policy uncertainty. Table 14 shows the effect of bank MPE on loan contract strictness by splitting the sample into periods of low and high monetary policy uncertainty based on the three different measures. For each measure, the effect is strong and significant for periods of high uncertainty but not significant for periods of low uncertainty.

Heterogeneity in loan characteristics provides additional evidence for the causal interpretation of the link between bank MPE and contract strictness. First, I exploit the heterogeneity of loans with respect to maturity. In response to monetary policy tightening, banks have two options to decrease lending amounts to their existing customers. Either they must wait until the loan expiration date and then not renew the loan or they may use their contractual rights to decrease the loan amount if financial covenants are violated. This implies that the cost of not having stricter loan contracts is higher for long-term loans because there is more time until the loan expiration date. On the other hand, for short-term loans, waiting until the maturity date of the loan to terminate the loan contract is less costly. Furthermore, the longer the horizon is, the higher the probability that banks will see an increase in the Fed funds rates and the higher the probability that they will want to cut their lending amount. Hence, the incentive to impose stricter loan covenants to gain flexibility for future contingencies is also higher. Therefore, if the driver of the strict loan contracts of banks with high monetary policy exposure is their concerns about the future path of monetary policy, the incentive to write strict loan contracts should be higher when originating long-term loans. In column (1) of Table 15, I interact loan maturity with the monetary policy exposure of banks. The coefficient of the interaction term is positive and significant. In column (2), I estimate separate coefficients for loans with different maturities. In particular, I estimate separate coefficients for loans with a maturity of 0 to 2 years, loans with a maturity of 2 to 4 years, and loans with a maturity of more than 4 years. The results support my prediction. I find that the coefficients for longer-term loans are significantly higher than those for short-term loans.

Another loan characteristic that provides more insight into the mechanism is the type of loan contract. There are two main types of loan contracts in the DealScan data: lines of credit and term loans. Lines of credit loans are commitment loans in which banks commit themselves to provide a contractually determined loan amount to their borrowers on demand as long as the borrowers satisfy certain conditions (i.e., financial ratio covenants), while term loans include an upfront advance of the loan amount to borrowers. Column (3) of Table 15 explores the heterogeneity in the effect of monetary policy exposure on contract strictness with respect to loan type. I estimate separate coefficients for the two types of loans and show that the effect is significant only for lines of credit. This finding is noteworthy for several reasons. First, if banks wish to decrease the loan amount following a covenant violation, then this means that term loan borrowers must repay the loan amount to the lender, whereas line-of-credit borrowers simply lose their access to bank loans. The impact of decreasing the loan amount, therefore, is more detrimental for term loan borrowers than for line-of-credit borrowers. Considering the reputation concerns of banks and their desire to maintain relationships with their existing borrowers, the effect should be expected to be stronger for line-of-credit loans. This finding is also consistent with the findings of Chodorow-Reich and Falato (2017), who show that during the financial crisis, in response to covenant violations, banks tend to change the contract terms of lines of credit more than those of term loans, and with the findings of Section 3.2 that following an increase in the Fed funds rate, banks with higher monetary policy exposure decrease their loan supply following a covenant violation only for lines of credit. Second, this finding is also consistent with the literature on loan sales. In the syndicated loan market, the percentage of term loans that are sold to institutional investors is higher than that of lines of credit (Drucker and Puri, 2008; Gatev and Strahan, 2009; Irani and Meisenzahl, 2017). This indicates that banks have less exposure to term loans because they do not keep them on their balance sheets and therefore should have less incentive to write stricter loan contracts in the first place. Finally, from a bank perspective, lines of credit are more exposed to liquidity risk in the sense that the bank does not know the exact timing of loan withdrawals by its borrowers (Gatev and Strahan, 2009; Balasubramanyan et al., 2019), and hence has more incentive to gain flexibility for future contingencies.

A relevant question is why borrowers accept stricter loan contracts even if their own risk remains unchanged. Why do they not simply go to another bank with lower monetary policy exposure and obtain a loan with less strict covenants? This concern is related to the fact that borrowers, ceteris paribus, may desire less restrictive loan contracts because giving contingent control rights to their lenders restricts the optimal action space of borrowers in future contingencies and is therefore costly for them. As previously documented, offering lower loan spreads for multiple-bank firms in return for stricter covenants provides an explanation for this. Another potential explanation comes from the findings of two strands of literature. Switching across banks is not straightforward for borrowers. First, a wedge between internal and external costs of finance arises due to agency problems between lenders and borrowers. The greater the information asymmetry between the parties is, the higher the external finance premium. Second, banks are specialized at reducing this information asymmetry by generating soft information on their borrowers and using this information to serve them (Fama, 1985; Diamond, 1991; Petersen and Rajan, 1994; Drucker and Puri, 2008). The duration of the bank-borrower relationship is one of the most important determinants of the extent to which banks reduce the information asymmetry problem. These two strands of literature imply that if a borrower switches to a new bank, then the information asymmetry with its lender increases, which in turn raises its cost of financing. This switching cost gives banks monopoly power over their customers and hence allows them to write stricter loan contracts without losing customers. Therefore, I should find a stronger link between bank MPE and contract strictness for financially constrained borrowers that have less access to alternative external funding sources because these borrowers suffer more from information asymmetries.

I use two measures as proxies for borrower financial constraints: borrower asset size and credit rating. Small borrowers are usually more opaque and therefore more exposed to information asymmetries with their lenders, which implies that switching to a different bank is more difficult. Furthermore, they have limited access to sources of external funding other than bank lending (Hadlock and Pierce, 2010). Similarly, borrowers with no credit rating have limited access to the bond market as an external funding source (Sufi, 2007; Chava and Roberts, 2008). Therefore, they are expected to be subject to more monopoly power from their lenders. While columns (1) and (2) of Table 16 split the sample in two based on borrower size, columns (3) and (4) split the sample based on whether a borrower has a credit rating. The results support my hypothesis and show that the effect of monetary policy exposure on contract strictness is stronger for smaller borrowers and for borrowers with no credit rating.

Building on contract theory (Aghion and Bolton, 1992), Christensen and Nikolaev (2012) classify financial covenants into capital covenants and performance covenants. Capital covenants serve as an ex ante tool to protect the value of debtholders' claims in a firm by aligning the interests of debtholders and shareholders and are based on balance sheet information, such as restrictions on leverage and the current ratio. On the other hand, performance covenants detect any decline in firm performance and allow lenders to intervene to make changes in loan contracts and are based on income statement information, such as the interest coverage ratio and EBITDA level. Therefore, they distribute the control rights ex post. Table 17 tests whether monetary policy exposures of banks have heterogeneous effects on different covenant types. While contract strictness in column (1) is calculated by using all types of financial covenants in a loan contract, in columns (2) and (3), contract strictness is calculated based only on performance covenants and capital covenants, respectively. The effect of bank MPE is significant only on the strictness measure based on performance covenants. This finding is consistent with the idea that banks with high monetary policy exposure write stricter loan contracts to increase their control power over their customers ex post. If there were an omitted variable correlated with banks' loan market power or with borrower riskiness, one would expect the effect to also be significant for capital covenants.

Finally, I exploit the syndicate structure of loan contracts. Most loans in DealScan are syndicated loans in which there are lead and participant lenders. Each of these lenders is responsible for providing a certain share of the total loan amount, while lead lenders are responsible for executing the loan contract and monitoring the borrower. Because changing loan contract terms during renegotiations requires majority voting, the higher stakes of lead lenders imply a greater ability to change the loan contract terms. Therefore, the main hypothesis of the paper predicts that the relationship between bank MPE and contract strictness should be stronger for loans with a higher lead lender share. I use two aspects of syndicated loan structures: the share of lead lenders in the total loan amount and the concentration of lender shares. I use a subset of DealScan loan contracts that have lender share information to calculate these two measures. Table 18 shows that the effect is stronger for more concentrated syndicates with a larger lead lender share, consistent with the prediction of the hypothesis of the paper.

6 Discussion and Conclusion

There is a large literature on the bank lending channel of monetary policy transmission. This literature has documented that tight monetary policy lowers real economic activity by reducing the loan supply of banks to non-financial firms. However, how banks achieve reducing the loan supply to their existing borrowers is unclear because outstanding long-term loan contracts may prevent them from doing so. In this paper, I examine loan contract terms, and find that loan covenants help banks respond to a contractionary monetary policy shock.

I start by showing that banks use loan covenants as an ex-ante tool to prepare for future monetary policy shocks. In particular, banks with higher monetary policy exposure (i.e., banks that experience larger deposit outflows during monetary policy contractions) write tight loan contracts by using stricter covenants. This ex-ante behavior of banks makes borrowers more likely to violate covenants, giving banks the right to reduce lending ex-post when monetary policy shocks induce a contraction in their lending capacity. Then, I provide supporting evidence by showing that banks indeed use covenant violations as an opportunity to reduce lending during times of monetary policy contractions.

These findings indicate that loan covenants facilitate the transmission of monetary policy to the economy by giving banks more flexibility to respond to contractionary monetary policy shocks. This increased flexibility has implications for banks' lending behavior. Banks may adopt different strategies to respond to a decrease in their lending capacity during monetary policy contractions. One strategy could be to reject new loan applications and maintain the outstanding loans granted to existing borrowers. Another strategy could be to reduce the size of outstanding loans and take advantage of new, potentially more profitable lending opportunities as they arise. Stricter covenants increase banks' ability to follow the second strategy. In particular, stricter covenants lead to more frequent renegotiations and, hence, help banks reduce lending to covenant violators, which are precisely the types of borrowers to which banks may want to reduce lending when their lending capacity is hit by a shock. Therefore, covenants may help banks allocate their resources more efficiently during monetary policy contractions. However, the findings also indicate that firms are exposed to monetary policy shocks, even when they have long-term loans outstanding.

In this paper, I exploit the heterogeneity of banks' exposure to monetary policy and analyze its impact on their loan contracting behavior. The results may also extend to any bank characteristics that might influence the future willingness and/or capacity of banks to lend following a shock. For instance, some banks may hold a high share of a particular security, which may render the value and lending capacity of these banks more sensitive to changes in economic conditions. To the extent of their awareness of this sensitivity, banks may write stricter contracts to gain flexibility to reduce their lending as necessary in some future contingencies.

References

Aghion, P. and P. Bolton (1992). An incomplete contracts approach to financial contracting. *The review of economic Studies 59*(3), 473–494.

Almeida, H., M. Campello, B. Laranjeira, and S. Weisbenner (2011). Corporate debt maturity and the real effects of the 2007 credit crisis. *Critical Finance Review 1*, 3–58.

Amiti, M. and D. E. Weinstein (2018). How much do idiosyncratic bank shocks affect investment? evidence from matched bank-firm loan data. *Journal of Political Economy 126*(2), 525–587.

Baker, S. R., N. Bloom, and S. J. Davis (2016). Measuring economic policy uncertainty. *The quarterly journal of economics 131*(4), 1593–1636.

Balasubramanyan, L., A. N. Berger, and M. M. Koepke (2019). How do lead banks use their private information about loan quality in the syndicated loan market? *Journal of Financial Stability*.

Berger, A. N., D. Zhang, and Y. E. Zhao (2018). Bank specialness, credit lines, and loan structure. *Credit Lines, and Loan Structure (October 2018)*.

Bernanke, B. and A. Blinder (1992). The federal funds rate and the channels of monetary transmission. *American Economic Review 82*(4), 901–21.

Bernanke, B. S. and A. S. Blinder (1988). Credit, money, and aggregate demand. *The American Economic Review 78*(2), 435.

Billett, M. T., T.-H. D. King, and D. C. Mauer (2007). Growth opportunities and the choice of leverage, debt maturity, and covenants. *The Journal of Finance 62*(2), 697–730.

Blinder, A. S. and J. E. Stiglitz (1983). Money, credit constraints, and economic activity. *American Economic Review 73*(2), 297–302.

Bradley, M. and M. R. Roberts (2015). The structure and pricing of corporate debt covenants. *The Quarterly Journal of Finance 5*(02), 1550001.

Chakraborty, I., I. Goldstein, and A. MacKinlay (2018). Housing price booms and crowding-out effects in bank lending. *The Review of Financial Studies 31*(7), 2806–2853.

Chava, S., V. Nanda, and S. C. Xiao (2017). Lending to innovative firms. *The Review of Corporate Finance Studies 6*(2), 234–289.

Chava, S. and M. R. Roberts (2008). How does financing impact investment? the role of debt covenants. *The Journal of Finance 63*(5), 2085–2121.

Chodorow-Reich, G. and A. Falato (2017). The loan covenant channel: How bank health transmits to the real economy. Technical report, National Bureau of Economic Research.

Christensen, H. B. and V. V. Nikolaev (2012). Capital versus performance covenants in debt contracts. *Journal of Accounting Research 50*(1), 75–116.

Cremers, M., M. Fleckenstein, and P. Gandhi (2017). Treasury yield implied volatility and real activity.

Demerjian, P. R. and E. L. Owens (2016). Measuring the probability of financial covenant violation in private debt contracts. *Journal of Accounting and Economics 61*(2-3), 433–447.

Demiroglu, C. and C. M. James (2010). The information content of bank loan covenants. *The Review of Financial Studies 23*(10), 3700–3737.

Diamond, D. W. (1991). Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of political Economy 99*(4), 689–721.

Drechsler, I., A. Savov, and P. Schnabl (2017). The deposits channel of monetary policy. *The Quarterly Journal of Economics 132*(4), 1819–1876.

Drucker, S. and M. Puri (2008). On loan sales, loan contracting, and lending relationships. *The Review of Financial Studies 22*(7), 2835–2872.

Fama, E. F. (1985). What's different about banks? *Journal of monetary economics 15*(1), 29–39.

Favara, G. and M. Giannetti (2017). Forced asset sales and the concentration of outstanding debt: evidence from the mortgage market. *The Journal of Finance 72*(3), 1081–1118.

Garmaise, M. J. and T. J. Moskowitz (2006). Bank mergers and crime: The real and social effects of credit market competition. *the Journal of Finance 61*(2), 495–538.

Gatev, E. and P. E. Strahan (2009). Liquidity risk and syndicate structure. *Journal of Financial Economics 93*(3), 490–504.

Gertler, M. and S. Gilchrist (1994). Monetary policy, business cycles, and the behavior of small manufacturing firms. *The Quarterly Journal of Economics 109*(2), 309–340.

Gomez, M., A. Landier, D. Sraer, and D. Thesmar (2016). Banks' exposure to interest rate risk and the transmission of monetary policy.

Gorodnichenko, Y. and M. Weber (2016). Are sticky prices costly? evidence from the stock market. *American Economic Review 106*(1), 165–99.

Graham, J. R. and C. R. Harvey (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of financial economics 60*(2-3), 187–243.

Green, D. (2018). Corporate refinancing, covenants, and the agency cost of debt. Technical report, Working Paper.

Hadlock, C. J. and J. R. Pierce (2010). New evidence on measuring financial constraints: Moving beyond the kz index. *The Review of Financial Studies 23*(5), 1909–1940.

Houston, J., C. James, and D. Marcus (1997). Capital market frictions and the role of internal capital markets in banking. *Journal of Financial Economics 46*(2), 135–164.

Husted, L., J. H. Rogers, and B. Sun (2017). Monetary policy uncertainty. *FRB International Finance Discussion Paper* (1215).

Irani, R. M. and R. R. Meisenzahl (2017). Loan sales and bank liquidity management: Evidence from a us credit register. *The Review of Financial Studies 30*(10), 3455–3501.

Jiménez, G., S. Ongena, J.-L. Peydró, and J. Saurina (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. *American Economic Review 102*(5), 2301–26.

Jiménez, G., S. Ongena, J.-L. Peydró, and J. Saurina (2014). Hazardous times for monetary policy: What do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking? *Econometrica 82*(2), 463–505.

Kashyap, A. K. and J. C. Stein (1994). Monetary policy and bank lending. In *Monetary policy*, pp. 221–261. The University of Chicago Press.

Kashyap, A. K. and J. C. Stein (1995). The impact of monetary policy on bank balance sheets. In *Carnegie-Rochester Conference Series on Public Policy*, Volume 42, pp. 151–195. Elsevier.

Kashyap, A. K. and J. C. Stein (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review 90*(3), 407–428.

Khwaja, A. I. and A. Mian (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review 98*(4), 1413–42.

Kishan, R. P. and T. P. Opiela (2000). Bank size, bank capital, and the bank lending channel. *Journal of Money, Credit and Banking*, 121–141.

Lin, H. and D. Paravisini (2013). The effect of financing constraints on risk. *Review of Finance 17*(1), 229–259.

Murfin, J. (2012). The supply-side determinants of loan contract strictness. *The Journal of Finance 67*(5), 1565–1601.

Nini, G., D. C. Smith, and A. Sufi (2012). Creditor control rights, corporate governance, and firm value. *The Review of Financial Studies 25*(6), 1713–1761.

Ongena, S. and D. C. Smith (2001). The duration of bank relationships. *Journal of financial economics 61*(3), 449–475.

Paravisini, D., V. Rappoport, and P. Schnabl (2015). Specialization in bank lending: Evidence from exporting firms. Technical report, National Bureau of Economic Research.

Petersen, M. A. and R. G. Rajan (1994). The benefits of lending relationships: Evidence from small business data. *The journal of finance 49*(1), 3–37.

Rauh, J. D. and A. Sufi (2010). Capital structure and debt structure. *The Review of Financial Studies 23*(12), 4242–4280.

Scharfstein, D. S. and A. Sunderam (2016). Market power in mortgage lending, refinancing activity and mortgage rates.

Schenone, C. (2009). Lending relationships and information rents: Do banks exploit their information advantages? *The Review of Financial Studies 23*(3), 1149–1199.

Schwert, M. (2018). Bank capital and lending relationships. *The Journal of Finance 73*(2), 787–830.

Smith, C. W. and J. B. Warner (1979). On financial contracting: An analysis of bond covenants. *Journal of Financial Economics 7*(2), 117–161.

Sufi, A. (2007). Information asymmetry and financing arrangements: Evidence from syndicated loans. *The Journal of Finance 62*(2), 629–668.

Van den Heuvel, S. J. (2002). The bank capital channel of monetary policy. *The Wharton School, University of Pennsylvania, mimeo*, 2013–14.

Wang, Y., T. M. Whited, Y. Wu, and K. Xiao (2018). Bank market power and monetary policy transmission: Evidence from a structural estimation. *Available at SSRN 3049665*.

Figure 1
Average Loan Strictness

This figure plots the weighted average and inter-quartile range of loan contract strictness for the period between 1995 and 2013. The average is taken over a 1-year horizon and weighted by the loan amount.

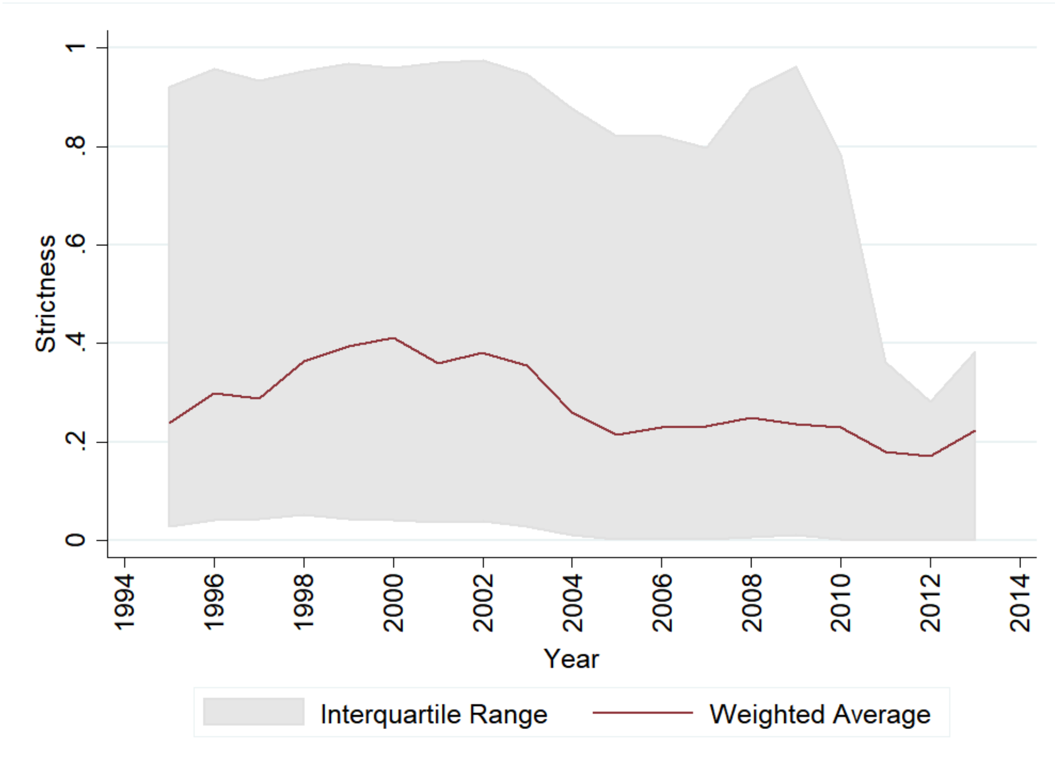

Table 1
Summary Statistics

The main sample I use in my analysis is a product of matching several datasets and consists of 7,765 loans with non-missing loan, firm, and bank characteristics for the period between 1995 and 2013. I include only U.S. dollar-denominated loans to non-financial firms with a single lead lender in the loan syndicate. Bank and firm characteristics are obtained from the last annual filings before the loan originations. The statistics are reported in three panels as follows: loan characteristics from DealScan are shown in Panel A, firm characteristics from Compustat at the firm-year level are shown in Panel B, and bank characteristics from Call Reports at the bank-year level are shown in Panel C. In each panel, the summary statistics are presented for two samples: a broader sample from the relevant dataset before the matching process (columns 1-2) and the main sample after matching (columns 3-7).

	Panel A: Loan Characteristics						
	DealScan Loans		Sample Loans				
	(1) Mean	(2) SD	(3) Mean	(4) SD	(5) 25^{th} perc.	(6) Median	(7) 75^{th} perc.
Line of credit (%)	79.90	40.07	86.49	34.18	100	100	100
Amount (mill. $)	291.33	323.90	385.78	389.46	80.00	230.00	575.00
Maturity (years)	4.22	1.92	3.84	1.55	3.00	4.84	5.00
Spread (bps)	249.52	121.36	167.29	91.58	88.00	150.00	250.00
Secured (%)	78.65	40.97	60.95	48.79	0.00	100.00	100.00
# of synd. members	5.44	4.72	8.69	6.59	3.00	7.00	13.00
Strictness	-	-	0.34	0.40	0.01	0.10	0.83
Obs. (Loan)	44,244		7,765				

	Panel B: Firm Characteristics						
	Compustat Firms		Sample Firms				
	(1) Mean	(2) SD	(3) Mean	(4) SD	(5) 25^{th} perc.	(6) Median	(7) 75^{th} perc.
Size (bill. $)	0.94	1.54	1.87	2.47	0.19	0.70	2.36
Tobin's q	1.97	1.26	1.55	0.59	1.07	1.36	1.90
Leverage (%)	17.00	16.42	22.40	16.31	7.71	21.68	34.75
Tangibility (%)	30.09	23.90	31.70	21.92	12.81	25.55	48.15
Cash/Assets (%)	14.73	15.78	7.91	8.16	1.40	4.39	12.42
Altman's z	2.30	3.53	3.24	1.92	1.67	2.90	4.53
Fixed coverage	2.84	7.10	5.51	6.05	1.31	2.95	7.09
Have S&P Rating	0.22	0.41	0.41	0.49	0.00	0.00	1.00
Obs. (Firm x Year)	113,185		32,454				

Table 1 − *Continued*

	Panel C: Bank Characteristics						
	Call Report Banks		Sample Banks				
	(1) Mean	(2) SD	(3) Mean	(4) SD	(5) 25^{th} perc.	(6) Median	(7) 75^{th} perc.
MPE, Bank	0.22	0.13	0.18	0.07	0.14	0.18	0.21
Size (bill. $)	0.17	0.17	55.08	67.00	6.94	21.54	78.95
Liquidity/Assets (%)	30.82	12.44	26.53	9.13	19.44	24.62	32.16
Loans/Assets (%)	61.55	12.46	62.55	10.97	56.66	65.25	70.84
Deposits/Liab. (%)	95.08	4.86	74.67	14.19	65.91	76.37	86.53
Wholesale/Liab. (%)	3.96	4.70	16.03	7.57	9.53	16.14	22.25
Equity/Assets (%)	10.26	2.36	8.87	1.65	7.48	8.49	10.04
Obs. (Bank x Year)	126,841		1,163				

Table 2
Monetary Policy Exposure of Banks and Covenant Strictness: Baseline Specification

This table presents the results of the following loan-level regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_t + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, and δ_t are firm, bank, and year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, leverage, current ratio, tangible asset ratio, Altman's z-score, and fixed coverage ratio. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized, i.e., β shows the impact of a one-standard-deviation increase in bank monetary policy exposure on covenant strictness. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Main Sample					Additional Controls	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MPE, Bank	0.04**	0.06***	0.06***	0.07***	0.07***	0.07***	0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Size			-0.05**	-0.04**	-0.06***	-0.06***	-0.05**
			(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Tobin's q			-0.06***	-0.06***	-0.06***	-0.06***	-0.01
			(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Leverage			0.07***	0.07***	0.07***	0.06***	0.04***
			(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Current ratio							-0.03***
							(0.01)
Tangibility							-0.03
							(0.02)
Altman's z							-0.07***
							(0.02)
Fixed coverage ratio							-0.01***
							(0.00)
Controls & FEs:							
Rating Dummies	✓	✓	✓	✓	✓	✓	✓
Bank Controls				✓	✓	✓	✓
Loan Controls					✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓
Firm FE		✓	✓	✓	✓	✓	✓
Bank FE		✓	✓	✓	✓	✓	✓
Obs.	7,765	7,765	7,765	7,765	7,765	7,186	7,186
R^2(Adj.)	0.108	0.412	0.432	0.432	0.434	0.439	0.449

Table 3
Monetary Policy Exposure of Banks and Loan Maturity

This table presents the results of the following loan-level regression model:

$$Maturity_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_t + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the maturity of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, and δ_t are firm, bank, and year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, leverage, current ratio, tangible asset ratio, Altman's z-score, and fixed coverage ratio. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized, i.e., β shows the impact of a one-standard-deviation increase in bank monetary policy exposure on loan maturity. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Main Sample					Additional Controls	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MPE, Bank	0.04	0.01	0.01	0.01	0.03	0.04	0.03
	(0.06)	(0.06)	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)
Size			0.00	0.01	0.18***	0.18***	0.17***
			(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
Tobin's q			-0.02	-0.01	-0.03**	-0.02	-0.06***
			(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Leverage			0.00	0.00	0.00	-0.00	0.02
			(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Current ratio							-0.01
							(0.01)
Tangibility							0.01
							(0.03)
Altman's z							0.08***
							(0.03)
Fixed coverage ratio							-0.01
							(0.01)
Controls & FEs:							
Rating Dummies	✓	✓	✓	✓	✓	✓	✓
Bank Controls				✓	✓	✓	✓
Loan Controls					✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓
Firm FE		✓	✓	✓	✓	✓	✓
Bank FE		✓	✓	✓	✓	✓	✓
Obs.	7,765	7,765	7,765	7,765	7,765	7,186	7,186
R^2(Adj.)	0.141	0.306	0.306	0.307	0.470	0.474	0.476

Table 4
Covenant Strictness and Covenant Violation

This table presents the results of the following loan-level regression model:

$$Violation_{\ell,f,b,t} = \beta Strictness_{\ell,f,b,t} + \delta_t + \psi_{ind} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan and merged with the covenant violation data from Nini et al. (2012) in columns (1)-(3) and data from Chava et al. (2017) in columns (4)-(6). The dependent variable is a dummy variable that takes a value of 1 if a financial covenant of loan contact l originated by bank b to firm f during year t is violated at any time during the life of the loan contract, and 0 otherwise; $Strictness_{\ell,f,b,t}$ is the strictness of the same loan contract at origination; δ_t, and ψ_{ind} are year and firm's industry fixed effects, respectively; and $\mathbf{F}_{f,t-1}$ and $\mathbf{L}_{\ell,f,b,t}$ are firm and loan control variables, respectively. Firm Controls: size, Tobin's q, leverage, current ratio, tangible net worth, Altman's z-score, and fixed coverage ratio. Loan Controls: loan amount, loan maturity, and the number of lenders in the loan syndicate. Fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized, i.e., β shows the impact of a one-standard-deviation increase in covenant strictness on covenant violation. The regression coefficients of the probit models are reported in terms of marginal effects at the mean value. Standard errors are clustered at the firm level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Nini et al. (2012)			Chava et al. (2017)		
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	Probit	OLS	OLS	Probit
Strictness	0.10***	0.07***	0.07***	0.07***	0.06***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Size		-0.09***	-0.11***		-0.09***	-0.10***
		(0.01)	(0.01)		(0.02)	(0.02)
Tobin's q		-0.02**	-0.02***		0.02	0.02
		(0.01)	(0.01)		(0.01)	(0.01)
Leverage		0.01	0.01		0.01	0.01
		(0.01)	(0.01)		(0.01)	(0.01)
Current ratio		-0.00	0.00		0.00	-0.00
		(0.01)	(0.01)		(0.01)	(0.01)
Tangibility		-0.01	-0.01		0.01	0.01
		(0.01)	(0.01)		(0.01)	(0.01)
Altman's z		-0.02**	-0.02**		-0.06***	-0.06***
		(0.01)	(0.01)		(0.02)	(0.02)
Fixed coverage ratio		-0.00	-0.00		0.01	0.01
		(0.01)	(0.01)		(0.01)	(0.01)
Loan maturity		0.02***	0.02***		0.02***	0.02***
		(0.00)	(0.00)		(0.00)	(0.00)
Loan amount		-0.02*	-0.01		0.05***	0.06***
		(0.01)	(0.01)		(0.02)	(0.02)
No. of Lead Lenders		-0.01	-0.01		-0.01	-0.01
		(0.01)	(0.01)		(0.01)	(0.01)
Controls & FEs:						
Year FE	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓
Obs.	8,928	8,926	8,926	2,426	2,426	2,426
R^2(Adj.)	0.099	0.146	0.146	0.048	0.073	0.073

Table 5
Lending Response to Changes in the Fed Funds Rate: Monetary Policy Exposure of Banks

This table presents the results of the following regression model:

$$log(loan)_{f,b,t} = \beta(MPE_{b,t-1} \times \Delta ff_t) + \mu BankControls_{b,t-1} + \theta_{f,t} + \eta_b + \epsilon_{f,b,t}$$

The data are at the firm-bank-year level from DealScan for the period between 1995 and 2013. The sample in each column consists only of firms that work with at least two banks in a given year and excludes all other firms. The dependent variable is the log of the outstanding loan amount between bank b and firm f in year t, $MPE_{b,t-1}$ is the bank-level monetary policy exposure of bank b in year $t-1$, Δff_t is the change in the Fed funds rate from year $t-1$ to t, $\theta_{f,t}$ are firm-year fixed effects for firm f, and η_b are bank fixed effects for bank b. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Columns (1) and (2) are panel estimations in which firm, year, and bank fixed effects are used, whereas columns (3) and (4) are within-firm estimations in which firm-year and bank fixed effects are used. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Panel Estimation		Within-firm Estimation	
	(1)	(2)	(3)	(4)
MPE, Bank x $\Delta FedFunds$	-0.013**	-0.021***	-0.014**	-0.020***
	(0.006)	(0.008)	(0.007)	(0.006)
MPE, Bank	-0.057*	-0.060*	-0.037	-0.040
	(0.032)	(0.031)	(0.029)	(0.028)
Size, Bank x $\Delta FedFunds$		0.009**		0.005*
		(0.004)		(0.003)
Equity, Bank x $\Delta FedFunds$		0.010		0.009
		(0.006)		(0.006)
Liquidity, Bank x $\Delta FedFunds$		-0.006		-0.007**
		(0.005)		(0.003)
Controls & FEs:				
Bank Controls	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓
Firm FE	✓	✓		
Year FE	✓	✓		
Firm x Year FE			✓	✓
Obs.	196,501	196,501	196,501	196,501
R^2(Adj.)	0.497	0.497	0.775	0.775

Table 6

Lending Response to Changes in the Fed Funds Rate: Monetary Policy Exposure of Banks Loan Refinancing and Covenant Violation

This table presents the results of several variations of the following regression model:

$$log(loan)_{f,b,t} = \beta \underbrace{(MPE_{b,t-1} \times \Delta ff_t)}_{Main\,Interaction\,Term} + Interaction\ Terms + \mu Bank\ Controls_{b,t-1} + \theta_{f,t} + \eta_b + \epsilon_{f,b,t}$$

The data are at the firm-bank-year level from DealScan for the period between 1995 and 2013. The sample in each column consists only of firms that work with at least two banks in a given year and excludes all other firms. The dependent variable is the log of the outstanding loan amount between bank b and firm f in year t, $MPE_{b,t-1}$ is the bank-level monetary policy exposure of bank b in year $t-1$, Δff_t is the change in the Fed funds rate from year $t-1$ to t, $\theta_{f,t}$ are firm-year fixed effects for firm f, and η_b are bank fixed effects for bank b. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. In columns (1) and (2), the main interaction term is further interacted with the following two sets of dummies: refinancing and lines of credit. The refinancing dummy takes a value of 1 if a refinancing loan contract replaces an existing loan contract during a given year. The lines of credit dummy takes a value of 1 for lines of credit loans and 0 for term loans. In columns (3) and (4), the main interaction term is further interacted with the following two sets of dummies: covenant violations and lines of credit. The covenant violation dummy takes a value of 1 if a firm violates a covenant during a given year. The total size and significance of the coefficients for the two types of loans (i.e., lines of credit vs. term loans) under two different states (i.e., refinancing vs. no refinancing or violation vs. no violation) are reported at the bottom of the table. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Refinancing		Violation	
	(1)	(2)	(3)	(4)
MPE, Bank x $\Delta FedFunds$	-0.029***	-0.037***	0.001	0.006
	(0.011)	(0.013)	(0.009)	(0.015)
MPE, Bank x $\Delta FedFunds$ x Refinancing	0.014	0.028*		
	(0.013)	(0.015)		
MPE, Bank x $\Delta FedFunds$ x LoC		0.029**		
		(0.014)		
MPE, Bank x $\Delta FedFunds$ x LoC x Refinancing		-0.037**		
		(0.017)		
MPE, Bank x $\Delta FedFunds$ x Violation			-0.031*	-0.036
			(0.018)	(0.031)
MPE, Bank x $\Delta FedFunds$ x LoC				-0.001
				(0.015)
MPE, Bank x $\Delta FedFunds$ x LoC x Violation				-0.024
				(0.042)
Controls & FEs:				
Bank Controls	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓
Firm x Year FE	✓	✓	✓	✓
Obs.	196,501	185,355	79,208	75,279
R^2(Adj.)	0.776	0.813	0.774	0.808
Coefficient - Term loans		-0.037***		0.006
Coefficient - Term loans after Refinancing/Violation		-0.008		-0.030
Coefficient - LoC loans		-0.008		0.005
Coefficient - LoC loans after Refinancing/Violation		-0.017**		-0.056**

Table 7
Monetary Policy Exposure of Banks and Covenant Strictness: Controlling for Industry-specific Loan Market Power

This table presents the results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year level monetary policy exposure of bank b in year $t-1$; α_f, η_b, and $\delta_{ind,t}$ are firm, bank, and firm industry-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Column (1) replicates the baseline specification in column (5) of Table 2. Columns (2) through (4) control for the loan market concentration in a given industry by including the industry's loan market HHI, which is calculated by using the syndicated loan market shares of banks in the industry (several alternative industry definitions are used). Columns (5) through (7) control for time-varying industry characteristics by using a within-industry estimation. The loan market share of banks in their borrowers' industries is also controlled for. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Baseline	Control Loan Market Concentration			Within-industry Estimation		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MPE, Bank	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
HHI (loan), Industry (SIC-1)		0.01					
		(0.00)					
HHI (loan), Industry (FF-10)			-0.00				
			(0.01)				
HHI (loan), Industry (FF-48)				0.02***			
				(0.01)			
Loan market share, Bank (SIC-1)					0.00		
					(0.02)		
Loan market share, Bank (FF-10)						0.03**	
						(0.01)	
Loan market share, Bank (FF-48)							0.01
							(0.01)
Controls & FEs:							
Firm, Bank, Loan Controls	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓			
Industry (SIC-1) x Year FE					✓		
Industry (FF-10) x Year FE						✓	
Industry (FF-48) x Year FE							✓
Firm FE	✓	✓	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓	✓
Obs.	7,765	7,765	7,765	7,765	7,652	7,654	7,317
R^2(Adj.)	0.434	0.434	0.434	0.435	0.435	0.438	0.444

Table 8
Monetary Policy Exposure of Banks and Covenant Strictness: Controlling for Relationship-specific Loan Market Power

This table presents the results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, and $\delta_{ind,t}$ are firm, bank, and firm industry-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)
MPE, Bank	0.07***	0.08***	0.07***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)
Relationship intensity		0.03**	0.04	0.08***
		(0.02)	(0.03)	(0.03)
Relationship duration			-0.00	-0.01
			(0.01)	(0.01)
Switched lender				-0.03
				(0.02)
Immediate prior lender				-0.02
				(0.02)
First loan				0.07***
				(0.02)
Controls & FEs:				
Firm, Bank, Loan Controls	✓	✓	✓	✓
Industry x Year FE	✓	✓	✓	✓
Firm x Bank FE	✓	✓	✓	✓
Obs.	6,288	6,288	6,288	6,288
R^2(Adj.)	0.485	0.485	0.485	0.486

Table 9
Monetary Policy Exposure of Banks and Covenant Strictness: Controlling for Local Loan Market Power

This table presents the results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{loc,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, $\delta_{ind,t}$, and $\psi_{loc,t}$ are firm, bank, firm industry-year, and firm location-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Columns (1) and (2) use location-year fixed effects for a within-location estimation. In columns (3) through (5), the geographic source of the variation in bank monetary policy exposure is considered. Specifically, column (3) creates a new county-specific measure for bank monetary policy exposure, which is calculated by excluding the deposit market of the county in which the firm is located. The variation in bank monetary policy exposure comes from all counties in which the bank raises deposits, other than the firm's county. Column (4) excludes the observations from the sample if the deposits of the bank in its borrower's county constitute more than 1 percent of its total deposits. Column (3) uses only the loan observations for which the bank has no presence in the deposit market of its borrower's county. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Within-Location Estimation		Source of Variation		
	(1) Within State	(2) Within County	(3) Exclude Own County	(4) Low Share	(5) No Share
MPE, Bank	0.09***	0.10***		0.10***	0.09**
	(0.03)	(0.04)		(0.03)	(0.04)
MPE, Bank (others)			0.07***		
			(0.03)		
Size	-0.10***	-0.08***	-0.10***	-0.12***	-0.06
	(0.02)	(0.03)	(0.02)	(0.04)	(0.05)
Tobin's q	-0.06***	-0.07***	-0.06***	-0.05***	-0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Leverage	0.06***	0.07***	0.06***	0.07***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Controls & FEs:					
Rating Dummies	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓
Loan Controls	✓	✓	✓	✓	✓
Industry x Year FE	✓	✓	✓	✓	✓
State x Year FE	✓		✓	✓	✓
County x Year FE		✓			
Firm FE	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓
Obs.	7,609	5,795	7,609	4,678	2,549
R^2(Adj.)	0.431	0.426	0.431	0.457	0.436

Table 10
Monetary Policy Exposure of Banks and Covenant Strictness: Within-firm Estimation (1)

The sample in this table consists only of firms that have outstanding loans from at least two banks in a given year and excludes all other firms because the coefficient is not identified for single-bank firms in regressions with firm-year fixed effects. Outstanding loans between a firm and a bank in a given year are determined based on the activation date and the maturity date of the loans.

Columns (1)-(3) present the results of the following panel estimation:
$Strictness_{f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_t + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell(t),f,b} + \epsilon_{f,b,t}$

Columns (4)-(6) present the results of the following within-borrower estimation:
$Strictness_{f,b,t} = \beta MPE_{b,t-1} + \xi_{f,t} + \eta_b + \Gamma \mathbf{B}_{b,t-1} + \Theta \mathbf{L}_{\ell(t),f,b} + \epsilon_{f,b,t}$

The data are at the firm-bank-year level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of the loan contract that is outstanding between bank b and firm f in year t; $MPE_{b,t-1}$ is the bank-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, δ_t, and $\xi_{f,t}$ are firm, bank, year, and firm-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell(t),f,b}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Panel Estimation			Within-firm Estimation		
	(1)	(2)	(3)	(4)	(5)	(6)
MPE, Bank	0.04*	0.06**	0.06**	0.05*	0.08**	0.08**
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Controls & FEs:						
Firm Controls	✓	✓	✓			
Bank Controls		✓	✓		✓	✓
Loan Controls			✓			✓
Firm FE	✓	✓	✓			
Year FE	✓	✓	✓			
Firm x Year FE				✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
Obs.	3,065	3,065	3,065	3,065	3,065	3,065
R^2	0.677	0.678	0.685	0.734	0.735	0.740

Table 11
Monetary Policy Exposure of Banks and Covenant Strictness: Within-firm Estimation (2)

The sample in this table consists only of firms that have new loan originations from at least two banks in a given period (i.e., a moving 4-quarter timeframe instead of a calendar year) and excludes all other firms because the coefficient is not identified for single-bank firms in regressions with firm-period fixed effects.

Columns (1)-(3) present the results of the following panel estimation:
$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_t + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$

Columns (4)-(6) present the results of the following within-firm estimation:
$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \xi_{f,p(t)} + \delta_t + \eta_b + \Gamma \mathbf{B}_{b,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level lagged monetary policy exposure of bank b; α_f, η_b, δ_t, and $\xi_{f,p(t)}$ are firm, bank, calendar year, and firm-period fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Panel Estimation			Within-firm Estimation		
	(1)	(2)	(3)	(4)	(5)	(6)
MPE, Bank	0.12**	0.12**	0.12**	0.12	0.12*	0.13*
	(0.05)	(0.05)	(0.05)	(0.07)	(0.07)	(0.07)
Controls & FEs:						
Firm Controls	✓	✓	✓			
Loan Controls		✓	✓		✓	✓
Bank Controls			✓			✓
Firm FE	✓	✓	✓			
Calendar Year FE	✓	✓	✓	✓	✓	✓
Firm x Period FE				✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
Obs.	557	557	557	557	557	557
R^2(Adj.)	0.689	0.698	0.697	0.667	0.679	0.679

Table 12
Monetary Policy Exposure of Banks and Loan Spread: Within-firm Estimations

The sample in this table consists only of firms that have new loan originations from at least two banks in a given year (period) and excludes all other firms because the coefficient is not identified for single-bank firms in regressions with firm-year (firm-period) fixed effects.

Columns (1)-(3) present the results of the following within-firm estimation:
$Spread_{\ell,f,b,t} = \beta MPE_{b,t-1} + \xi_{f,t} + \eta_b + \Gamma \mathbf{B}_{b,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$

Columns (4)-(6) present the results of the following within-firm estimation:
$Spread_{\ell,f,b,t} = \beta MPE_{b,t-1} + \xi_{f,p(t)} + \delta_t + \eta_b + \Gamma \mathbf{B}_{b,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the logged loan spread (over LIBOR) of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level lagged monetary policy exposure of bank b; $\xi_{f,t}$ ($\xi_{f,p(t)}$), δ_t, and η_b are firm-year (firm-period), bank, and calendar year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$ and $\mathbf{L}_{\ell,f,b,t}$ are bank and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Within-firm Estimation (1)			Within-firm Estimation (2)		
	(1)	(2)	(3)	(4)	(5)	(6)
MPE, Bank	-0.11*	-0.14**	-0.14**	-0.12*	-0.16**	-0.15**
	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)
Controls & FEs:						
Bank Controls		✓	✓		✓	✓
Loan Controls			✓			✓
Firm x Year FE	✓	✓	✓			
Firm x Period FE				✓	✓	✓
Calendar Year FE				✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
Obs.	1,190	1,190	1,190	2,555	2,555	2,555
R^2(Adj.)	0.592	0.599	0.659	0.596	0.602	0.666

Table 13
Monetary Policy Exposure of Banks and Covenant Strictness: Bank Mergers as an IV

This table presents the first- and second-stage results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta \hat{MPE}_{b,t-1} + \alpha_f + \eta_b + \delta_t + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $\hat{MPE}_{b,t-1}$ is the predicted bank monetary policy exposure, which is obtained by using simulated bank monetary policy exposure as an instrument; α_f, η_b, and δ_t are firm, bank, and year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	First Stage	IV
	(1) Dependent Variable: MPE, Bank	(2) Dependent Variable: Strictness
Simulated MPE, Bank	0.215**	
	(0.095)	
MPE, Bank		0.171**
		(0.082)
Controls & FEs:		
Firm, Bank, Loan Controls	✓	✓
Firm FE	✓	✓
Bank FE	✓	✓
Year FE	✓	✓
Obs.	7,649	7,649
F-stat	11.22	55.97
R^2(Adj.)	0.70	0.45

Table 14
Heterogeneity: Monetary Policy Uncertainty

This table presents the results of the following regression model by dividing the sample into two subsamples based on the median values of several variables:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, bank, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Columns (1)-(2) divide the sample into two subsamples based on the implied interest rate volatility, columns (3)-(4) divide the sample based on the monetary policy uncertainty index, and columns (5)-(6) divide the sample based on the average size of the monetary policy shocks during the last one-year period. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Implied IR Vol		MPU Index		MP Shocks	
	(1) Low	(2) High	(3) Low	(4) High	(5) Low	(6) High
MPE, Bank	0.04	0.17***	-0.02	0.23***	0.06	0.19**
	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)
Size	-0.03	-0.12**	-0.10**	-0.17***	-0.09*	-0.14***
	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)
Tobin's q	-0.04***	-0.06**	-0.04***	-0.07***	-0.06***	-0.09***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Leverage	0.09***	0.05***	0.08***	0.07**	0.07***	0.09***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)
Controls & FEs:						
Rating Dummies	✓	✓	✓	✓	✓	✓
Bank, Loan Controls	✓	✓	✓	✓	✓	✓
Industry x Year FE	✓	✓	✓	✓	✓	✓
State x Year FE	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓	✓
Obs.	2,516	2,505	2,381	2,393	2,416	2,416
R^2(Adj.)	0.432	0.487	0.395	0.451	0.461	0.412

Table 15
Heterogeneity: Loan Characteristics

This table presents the results of several variations of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + Interactions + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, bank, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. In columns (1) and (2), $MPE_{b,t-1}$ is interacted with dummies showing different categories of loan maturity. In column (3), $MPE_{b,t-1}$ is interacted with the lines of credit dummy. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Maturity		Type
	(1)	(2)	(3)
MPE, Bank	0.03	0.06**	0.01
	(0.04)	(0.03)	(0.07)
MPE, Bank x log(Maturity)	0.01**		
	(0.01)		
MPE, Bank x Maturity(2 4]		0.03**	
		(0.02)	
MPE, Bank x Maturity(4 .]		0.02**	
		(0.01)	
MPE, Bank x LoC			0.16*
			(0.09)
Controls & FEs:			
Firm, Bank, and Loan Controls	✓	✓	✓
Industry x Year FE	✓	✓	✓
State x Year FE	✓	✓	✓
Firm FE	✓	✓	✓
Bank FE	✓	✓	✓
Obs.	6,852	6,852	3,960
R^2(Adj.)	0.421	0.421	0.425

Table 16
Heterogeneity: Firm Financial Constraints

This table presents the results of the following regression model by dividing the sample into two subsamples based on firm financial constraints:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, bank, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Columns (1)-(2) divide the sample of firms into two subsamples (Small vs. Large) based on the median value of the firm size distribution. Columns (3)-(4) divide the sample of firms into two subsamples (No Rating vs. Rating) based on whether the firms have an S&P rating. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Firm Size		S&P Rating	
	(1)	(2)	(3)	(4)
	Small	Large	No	Yes
MPE, Bank	0.13**	0.04**	0.18***	0.07**
	(0.05)	(0.02)	(0.05)	(0.03)
Size	-0.07	0.02	-0.11**	-0.04
	(0.05)	(0.09)	(0.05)	(0.07)
Tobin's q	-0.05**	-0.04**	-0.06***	-0.07***
	(0.02)	(0.01)	(0.02)	(0.01)
Leverage	0.04***	0.08***	0.05***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
Controls & FEs:				
Rating Dummies	✓	✓	✓	✓
Bank, and Loan Controls	✓	✓	✓	✓
Industry x Year FE	✓	✓	✓	✓
State x Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓
Obs.	3,378	3,359	3,333	3,371
R^2(Adj.)	0.311	0.511	0.352	0.492

Table 17
Heterogeneity: Covenant Types

This table presents the results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t. Each specification in the table uses a different measure of contract strictness. In column (1), which is the replication of column (5) of Table 9, contract strictness is calculated by using all types of financial covenants in a loan contract. In columns (2) and (3), contract strictness is calculated based on the following two subsets of financial covenants: performance and capital covenants, respectively. $MPE_{b,t-1}$ is the bank-year-level lagged monetary policy exposure of bank b; α_f, η_b, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, bank, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1) All Covenants	(2) Performance Covenants	(3) Capital Covenants
MPE, Bank	0.09***	0.08***	0.02
	(0.03)	(0.03)	(0.01)
Size	-0.10***	-0.10***	0.00
	(0.02)	(0.02)	(0.01)
Tobin's q	-0.06***	-0.06***	0.00
	(0.01)	(0.01)	(0.01)
Leverage	0.06***	0.06***	0.02***
	(0.01)	(0.02)	(0.01)
Controls & FEs:			
Rating Dummies	✓	✓	✓
Bank, and Loan Controls	✓	✓	✓
Industry x Year FE	✓	✓	✓
State x Year FE	✓	✓	✓
Firm FE	✓	✓	✓
Bank FE	✓	✓	✓
Obs.	7,609	7,609	7,609
R^2(Adj.)	0.431	0.434	0.339

Table 18
Heterogeneity: Loan Syndicate Structure

This table presents the results of the following regression model by dividing the sample into two subsamples based on the median values of several variables:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-year-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, bank, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Columns (1) and (2) divide the sample of loans into two subsamples (High vs. Low) based on the median value of the lead lender share in the loan commitment. Columns (3) and (4) divide the sample of loans into two subsamples (High vs. Low) based on the median value of the lender share concentration (i.e., the HHI of the lender shares in a loan). Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Lead Lender Share		Loan concentration	
	(1)	(2)	(3)	(4)
	High	Low	High	Low
MPE, Bank	0.199**	0.069	0.212**	0.074
	(0.088)	(0.041)	(0.103)	(0.045)
Controls & FEs:				
Firm, Bank, and Loan Controls	✓	✓	✓	✓
Industry x Year FE	✓	✓	✓	✓
State x Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓
Obs.	1,527	1,537	1,487	1,625
R^2(Adj.)	0.263	0.533	0.249	0.511

Table A1
Monetary Policy Exposure of Banks and Covenant Strictness: Including Loans with Multiple Lead Lenders

This table presents the results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. In contrast to the approach reported in Table 2, loans with multiple lead lenders are also included in this sample. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; $MPE_{b,t-1}$ is the bank-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, bank, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)
MPE, Bank	0.06***	0.06**	0.06***	0.09***	0.10***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)
Size		-0.05**	-0.07***	-0.10***	-0.08***
		(0.02)	(0.02)	(0.02)	(0.02)
Tobin's q		-0.07***	-0.06***	-0.06***	-0.07***
		(0.01)	(0.01)	(0.01)	(0.01)
Leverage		0.07***	0.07***	0.06***	0.07***
		(0.01)	(0.01)	(0.01)	(0.01)
Controls & FEs:					
Rating Dummies	✓	✓	✓	✓	✓
Bank, and Loan Controls			✓	✓	✓
Year FE	✓	✓	✓		
Industry x Year FE				✓	✓
State x Year FE				✓	
County x Year FE					✓
Firm FE	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓
Obs.	7,934	7,934	7,934	7,780	5,952
R^2(Adj.)	0.413	0.433	0.435	0.432	0.428

Table A2
Monetary Policy Exposure of Banks and Covenant Strictness: Pre-crisis Period

This table presents the results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_{b,t-1} + \alpha_f + \eta_b + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2007. The dependent variable is the strictness of loan contract l originated by bank b to firm f at time t; $MPE_{b,t-1}$ is the bank-level monetary policy exposure of bank b in year $t-1$; α_f, η_b, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, bank, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)
MPE, Bank	0.07*	0.08*	0.09**	0.10**	0.16***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
Size		-0.05*	-0.07***	-0.11***	-0.07*
		(0.03)	(0.03)	(0.03)	(0.04)
Tobin's q		-0.06***	-0.06***	-0.05***	-0.06***
		(0.01)	(0.01)	(0.01)	(0.01)
Leverage		0.07***	0.07***	0.07***	0.08***
		(0.01)	(0.01)	(0.01)	(0.01)
Controls & FEs:					
Rating Dummies	✓	✓	✓	✓	✓
Bank, and Loan Controls			✓	✓	✓
Year FE	✓	✓	✓		
Industry x Year FE				✓	✓
State x Year FE				✓	
County x Year FE					✓
Firm FE	✓	✓	✓	✓	✓
Bank FE	✓	✓	✓	✓	✓
Obs.	5,817	5,817	5,817	5,711	4,433
R^2(Adj.)	0.386	0.406	0.409	0.412	0.395

Table A3
Monetary Policy Exposure of Banks and Covenant Strictness: An Alternative Measure

This table presents the results of the following regression model:

$$Strictness_{\ell,f,b,t} = \beta MPE_b + \alpha_f + \delta_{ind,t} + \psi_{st,t} + \Gamma \mathbf{B}_{b,t-1} + \Lambda \mathbf{F}_{f,t-1} + \Theta \mathbf{L}_{\ell,f,b,t} + \epsilon_{\ell,f,b,t}$$

The data are at the loan level from DealScan for the period between 1995 and 2013. The dependent variable is the strictness of loan contract l originated by bank b to firm f during year t; MPE_b is the bank-level monetary policy exposure of bank b, which is the deposit spread beta of bank b and calculated by regressing the change in the bank deposit spread on the change in the Fed funds rate; α_f, $\delta_{ind,t}$, and $\psi_{st,t}$ are firm, firm industry-year, and firm state-year fixed effects, respectively; and $\mathbf{B}_{b,t-1}$, $\mathbf{F}_{f,t-1}$, and $\mathbf{L}_{\ell,f,b,t}$ are bank, firm, and loan control variables, respectively. Bank Controls: size, equity ratio, liquidity ratio, profitability, bank average deposit rate, the share of loans in total assets, and the share of deposits/wholesale funding in total liabilities. Firm Controls: Tobin's Q, size, and leverage. Loan Controls: loan amount, loan maturity, loan type, and loan purpose. Control variables and fixed effects are indicated at the bottom of each column. For ease of interpretation, all variables are standardized. Standard errors are two-way clustered at the firm and bank levels and are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Main Sample				Additional Controls	
	(1)	(2)	(3)	(4)	(5)	(6)
MPE, Bank	0.06**	0.06*	0.06*	0.06*	0.05*	0.06*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Size		-0.05**	-0.05**	-0.07***	-0.06**	-0.04
		(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
Tobin's q		-0.07***	-0.07***	-0.06***	-0.06***	-0.02
		(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Leverage		0.06***	0.06***	0.06***	0.05***	0.03**
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Current ratio						-0.05***
						(0.01)
Tangibility						-0.03
						(0.02)
Altman's z						-0.06***
						(0.02)
Fixed coverage ratio						-0.02***
						(0.00)
Controls & FEs:						
Rating Dummies	✓	✓	✓	✓	✓	✓
Bank Controls			✓	✓	✓	✓
Loan Controls				✓	✓	✓
Industry x Year FE	✓	✓	✓	✓	✓	✓
State x Year FE	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Obs.	7,494	7,494	7,494	7,494	6,893	6,893
R^2(Adj.)	0.411	0.429	0.429	0.431	0.433	0.446