Ownership Concentration and Performance of Deteriorating Syndicated Loans*

Mariassunta Giannetti Ralf R. Meisenzahl

December 16, 2021

Abstract

Regulation and capital constraints may force banks and collateralized loan obligations (CLOs) to sell deteriorating loans, potentially hampering renegotiation and amplifying the initial negative shock to the borrower. We show that banks and CLOs sell downgraded loans to mutual funds and hedge funds. The reallocation of loan shares favors the syndicate's concentration increasing lenders' incentives to renegotiate. However, syndicates remain less concentrated when potential buyers experience financial constraints and subsequently loans are less likely to be amended and more likely to be downgraded even further. Our findings indicate that existing regulations may amplify shocks to credit quality during periods of generalized distress in the financial system.

JEL Classification: G21
Keywords: Debtor Concentration; Credit Quality; Leveraged Lending.

*Mariassunta Giannetti (mariassunta.giannetti@hhs.se) is with the Stockholm School of Economics, CEPR and ECGI and Ralf Meisenzahl (Ralf.Meisenzahl@chi.frb.org) is with the Federal Reserve Bank of Chicago. We thank Kristian Blickle, Elena Loutskina Rui Silva, Ansgar Whalter, and seminar participants at the Bank of Spain and CEMFI Conference on Financial Stability, the 20th FDIC/JFSR Bank Research Conference, the BPI and Nova SBE Conference on Corporate Bankruptcy and Restructuring, the Norges Bank/CEPR Conference on Frontier Research in Banking, the Bank of Italy, Banque de France, the Shanghai University and Finance and Economics, and the University of Birmingham for comments. Giannetti acknowledges financial support from the Jan Wallander and Tom Hedelius Foundation. The views expressed here are those of the authors and do not necessarily reflect the views of the Board of Governors, the Federal Reserve Bank of Chicago or the staff of the Federal Reserve System.

1 Introduction

Following the Covid-19 shock, policymakers' and academics' concerns about the stability of the secondary loan market have focused on how financial frictions, arising from regulation and capital constraints of banks and collateralized loan obligations (CLOs), may cause shocks to spread across borrowers and lenders (Financial Stability Board 2019; Kothari et al. 2020). It has been somewhat neglected that the same frictions could amplify the effects of negative shocks to credit quality further undermining the resilience of the credit market to negative shocks.

The reason is that loans are typically renegotiated multiple times following changes in borrowers' financial health or increased uncertainty on their credit quality (Roberts 2015; Roberts and Sufi 2009). Renegotiation is particularly important when negative shocks occur and borrower credit quality deteriorates because covenants, which are set very tightly ex ante, are renegotiated ex post to avoid further deterioration in the borrowers' performance (Chava and Roberts 2008; Denis and Wang 2014). Renegotiation may be particularly important for loans that are traded in the secondary market, which have been shown to impose particularly restrictive ex ante conditions on borrowers (Drucker and Puri 2008) and is believed to be typically led by banks (Beyhaghi, Nguyen, and Wald 2019). Unfortunately, banks and CLOs, which hold over half of the outstanding syndicated loans, have regulatory incentives to sell deteriorating loans rather than engaging with the borrowers. This can potentially amplify the initial shock to the borrower's credit quality if the new buyers lack the skills and incentives to renegotiate and monitor the loan. Understanding how the financial system deals with deteriorating loans is therefore crucial.

Existing literature provides limited evidence on how the syndicate structure evolves following negative shocks to credit quality and which lenders purchase deteriorating loans in the secondary market. Documenting under what conditions initial shocks to credit quality are amplified is important to understand the resilience of the secondary loan market. Identifying the buyers of deteriorating loans, whether they have incentives to renegotiate, and the extent to which they also face financial frictions are necessary first steps in this direction.

We explore how the ownership structure of syndicated loans evolves following their

regulatory ratings' downgrades. We find that mutual funds and hedge funds replace banks and CLOs when the quality of the loan deteriorates. These intermediaries appear to be specialized in holding claims of borrowers with relatively low credit quality and purchase the claims from many sellers.

In principle, being unregulated, mutual funds and hedge funds could simply profit from purchasing at fire sales prices from intermediaries subject to capital and other regulatory constraints. By holding diversified portfolios, they could profit from the undervaluation of the distressed assets they purchase, even if the initial shock to the borrower's credit quality is amplified.

We find that while a few mutual funds and hedge funds enter the syndicate, others increase their existing loan shares. Ultimately, the syndicate's concentration increases after a regulatory downgrade, as shown in Figure 1. Creditor concentration in turn is expected to give lenders stronger incentives to renegotiate efficiently, as suggested by the theory of Bolton and Scharfstein (1996). In particular, lenders with larger shares should have stronger incentives to monitor and perform due diligence (Sufi 2007), which are crucial to efficiently renegotiate loan terms.

We investigate whether a concentrated structure indeed favors renegotiation. Such an interpretation would be consistent with evidence that syndicate concentration increases to a larger extent for loans that based on ex ante characteristics appear difficult to renegotiate because the lead bank maintained a low share at issuance or because the borrower's low asset tangibility would make asset liquidation particularly costly. However, establishing that syndicate concentration results in better loan outcomes is challenging because shadow intermediaries are likely to anticipate loan outcomes and are consequently unwilling to become too exposed to borrowers with worse outlooks.

To establish the direction of causality, we exploit exogenous variation in intermediaries' financial constraints arising from shocks to parts of these intermediaries' portfolios in industries that are unrelated to the specific loan we consider. The intuition is that in periods of distress in unrelated industries there are many loan shares for sale. Not only can intermediaries specialized in distressed loans be choosy on which loans to purchase, but having experienced the deterioration of other portfolio loans, they may face redemptions and do not have the capacity to deal with a large number of loans in distress. Put

differently, intermediaries that typically purchase deteriorating loans may have limited financial capacity to purchase more shares of deteriorating loans and to concentrate their ownership. Thus, the syndicated loans of borrowers whose quality deteriorates remain less concentrated when potential buyers have experienced large negative shocks to other parts of their portfolios for reasons that are arguably unrelated to the borrower's quality.

The financial constraints of potential buyers are a viable instrument for the ownership concentration of a loan as long as they predict the borrower's performance only though the loan's ownership concentration. Since we control for yearly shocks to the industry of the borrower and to the loan's lead banks as well as for loan fixed effects, our identifying assumption is that the sequence in which loans within an industry are downgraded during a year is unrelated to the quality of the borrower and the loan's future performance. We provide evidence supporting this identifying assumption. In particular, after controlling for macroeconomic and lender specific shocks using high-dimensional fixed effects, shocks to unrelated industries' loans in the portfolios of potential buyers do not predict the outcomes of loans that are not downgraded and whose future performance does not depend on the creditors' concentration. We can thus view the sequence in which loans in an industry are downgraded as unrelated to performance and exploit shocks to unrelated industries to generate exogenous variation in potential buyers' ability to concentrate the loan due to financial constraints. After absorbing shocks that affect an industry during a year, we show that the ownership of loans that are downgraded after quarters in which industry lenders have already experienced downgrades in other industries remain more disperse. In the second stage, loans with more disperse ownership are less likely to be amended and subsequently borrowers' quality is more likely to further worsen, as captured by a higher probability of future loan downgrades.

To the best of our knowledge, this is the first paper to explore the secondary market for deteriorating loans before a borrower enters bankruptcy. Existing literature documents that lead banks retain larger shares in loans to informationally opaque borrowers (Sufi 2007), although recent work by (Blickle et al. 2020) shows that lead banks tend to exit the syndicate shortly after the loan origination and thus questions the role of lead banks in monitoring borrowers. We show that negative shocks to credit quality are also associated with an increase in syndicate concentration.

Some of the mechanisms we highlight have parallels with the changes in debt ownership of borrowers in distressed restructuring. Existing literature highlights that the outcome of bankruptcy is typically better if vulture funds become involved in management (Hotchkiss and Mooradian 1997) or if hedge funds participate in the Chapter 11 process (Jiang, Li, and Wang 2012). Ivashina, Iverson, and Smith (2016) document that claims of companies in chapter 11 become more concentrated even though this process does not appear to improve distressed borrowers' outcomes. Gilson, John, and Lang (1990) show that firms with fewer lenders are more likely to restructure their troubled debt out of court. Brunner and Krahnen (2008) show that German banks tend to coordinate when borrowers experience signs of distress and that borrowers with fewer banks are more likely to be turned around out of court. By considering deteriorating loans, most of which cannot yet be considered in default, we examine a much larger sample of borrowers and show that syndicate concentration limits further deterioration of loans in early phases of distress. We also highlight how specialized lenders' financial constraints may lead to worse loan outcomes.

We also complement a growing literature exploring the consequences of asset sales by financial intermediaries. A strand of this literature studies the sales of loan shares by banks (Irani and Meisenzahl 2017; Irani et al. 2021), and CLOs (e.g., Loumioti and Vasvari (2019); Elkamhi and Nozawa (2020)) in the secondary loan market. While existing studies focus on the financing conditions of these highly regulated intermediaries, we consider how changes in loan health affect syndicate composition and how the latter is related to the subsequent performance of the loan. By highlighting the positive role of mutual funds and hedge funds in curing shocks to credit quality, our paper highlights that existing regulations may have negative effects on borrowers only in periods of generalized distress in the financial system. This partially mitigates concerns about the stability of the secondary loan market.

Finally, our results have implications for how the health of financial intermediaries affects loan outcomes. In this respect, our findings are related to Chodorow-Reich and Falato (forthcoming), who find that unhealthy banks use covenant violations to contract their credit supply. We show that not only can negative shocks increase the tightness of banks' and CLOs' regulatory constraints, but they may also impair hedge funds' and

mutual funds' ability to purchase loan shares, worsening loan outcomes.

2 Data

Overview We use a quarterly confidential regulatory credit register, the Shared National Credit Program (SNC), maintained by the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency, and, before 2011, the now-defunct Office of Thrift Supervision. Starting in 1997, regulators reviewed credits with minimum aggregate loan commitments totalling $20 million or more that were shared by two or more regulated financial institutions (banks) through annual surveys of administrative agent banks. In 1998, the minimum number of regulated financial institutions was increased from two to three and in 2018, the minimum aggregate loan commitment threshold was increased to $100 million.[1] Following the 2007-08 Financial Crisis, the surveys are conducted quarterly.

The SNC provides loan-level information on the borrower's identity, the date of origination and maturity, loan type (i.e., credit line or term loan), and a regulatory classification of loan quality that we describe in detail below. Most importantly, the data break out the loan syndicate membership, including nonbank lenders on a quarterly basis. Thus, as long as three banks continue to hold a share of the loan, we essentially observe the universe of loan shares, lenders, and any changes in ownership that occur over our sample period. We use this information to construct measures of loan ownership concentration and secondary market trading behavior.

Our sample includes 12,013 loans held by at least 3 supervised institutions in the U.S. between 2009Q4 and 2019Q4. We classify lenders as banks, CLOs, Hedge Funds, Mutual Funds, and other financial institutions based on the lender's name using the algorithm described in Cohen et al. (2018). Overall, we observe 12,108,437 loan shares (or 295,328 per quarter on average). The sample includes 69,837 unique lenders, of which 21,584 are classified as mutual funds and also include private funds that are run by banks and

[1]The SNC data include loan packages containing two or more facilities (e.g., a term loan and a line of credit) issued by a borrower on the same date where the sum exceeds $100 million. For annual regulatory reports, see https://www.federalreserve.gov/supervisionreg/snc.htm.

asset managers for qualified clients. Most mutual funds investing in syndicated bank loans are classified as "high yield" or "credit opportunity"; hence, they do not merely invest in bank loans. The sample also include 1,254 hedge funds. The category "Others" comprises 26,374 lenders and includes in order of importance pension funds, insurance companies, finance companies (including Business Development Companies and "loan funding LLCs"), and university endowments. Table A1 shows some characteristics of lenders' portfolios distinguishing by type.

Table 1 summarizes the main variables we use in the analysis.

Regulatory Ratings Since banks' capital regulation relies on regulatory measures of credit quality, in our empirical analysis, we rely predominantly on regulatory ratings. Specifically, we use the following five regulatory ratings:[2]

- **Pass**: The commitment is in good standing and is not criticized by supervisors in any way.
- **Special Mention**: The commitment has potential weaknesses that deserve the management's close attention. These potential weaknesses could result in further deterioration of the repayment prospects or of the institutions' credit position. However, the commitment does not expose institutions to sufficient risk to warrant an adverse rating.
- **Substandard**: The commitment is inadequately protected by the paying capacity of the obligor and/or of the collateral pledged. Substandard commitments have well-defined weaknesses that jeopardize the repayment of the debt and present the distinct possibility that the institution will sustain some loss if deficiencies are not addressed.
- **Doubtful**: The weaknesses make collection or liquidation in full, on the basis of the available current information, highly questionable or improbable.
- **Loss**: Loan amounts should be promptly charged off. While this classification does not mean that there is no recovery or salvage value, it is not practical or desirable

[2]For more details and definitions, see https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20151105a1.pdf

to defer writing off these commitments.

Overall, Pass loans are 85.2 percent of our sample; Special Mention loans are 6 percent, Substandard loans are 7.1 percent, Doubtful loans are 1.2 percent, and Loss loans are 0.5 percent.

Table 2 shows that loans with a Pass rating are unlikely to be downgraded; however, the probability of a rating change increases considerably for Special Mention loans. Therefore, banks may also sell Special Mention loans to avoid fire sale prices in case of further deterioration. Table 2 also shows that purchasing downgraded loans involves a significant upside for the buyer as improvements in ratings are at least as likely as further downgrades.

As shown in Figure 2, there exist a close correspondence between the bank's loan internal ratings, as reported by the bank that acts as administrative agent for the loan. The loan internal ratings have a much finer scale than regulatory ratings, and regulatory ratings. In what follows, we will use the internal ratings to create an alternative measure of loan performance.

Regulated Financial Intermediaries Banks with credits rated Substandard or worse are required to make loan-loss reserves of the following amounts: 20% (Substandard), 50% (Doubtful), and 100% (Loss) of the loan utilized exposure amount. Moreover, adverse ratings lead to higher probability of review in subsequent exams and heightened supervisory monitoring.[3] These provisions eat in the banks' capital buffers and increase a bank's cost of holding the loan on its balance sheet. For this reason, we expect banks to be inclined to sell loans that have been rated Substandard or worse.

Even though they are not subject to as stringent capital requirements as banks, CLOs are also subject to regulations that limit their ability to hold onto deteriorating loans. These intermediaries are bankruptcy-remote special-purpose vehicles that facilitate the securitization of corporate loans by purchasing tranches of primarily senior secured leveraged loans and using these loans' cash flows as collateral to back the issuance of new securities (see Loumioti and Vasvari (2019)) for a more detailed description). CLOs are believed to add value by exploiting regulatory frictions and purchasing the tranches of

[3]For details on the supervisory process and consequences, see Ivanov and Wang (2019).

loans that capital constrained banks sell (Cordell, Roberts, and Schwert 2021). However, they have to pass overcollateralization and interest rate coverage tests to cover, respectively, the principal and interest payments of the notes they issue. CLOs also face constraints aiming to ensure a certain portfolio quality. These tests are standardized across CLOs and are strongly influenced by credit rating agencies that require that the constraints are satisfied to provide certain target ratings for the CLOs' notes.

The constraints imposed on CLOs' portfolios have been shown to affect CLOs' trading behavior and to lead to fire sales. CLOs have to mark to market defaulted loans and loans with an agency rating of CCC or worse, instead of using historical values as for loans with better ratings. As a consequence, CLOs preventively sell deteriorating loans to avoid being affected by further downgrades (Elkamhi and Nozawa 2020). The constraints faced by CLOs are tied to agency ratings, not to regulatory ratings. However, there exists a close correspondence between the agency and regulatory ratings.

In addition, as we show below exploring loan outcomes, regulatory downgrades appear to predict (further) loan downgrades. Therefore, CLOs may sell in anticipation of agency downgrades.

Below, we document that less regulated entities, such as mutual funds and hedge funds, buy deteriorating loans, and we ask whether they lead to changes in the composition of the syndicate that may favor renegotiation.

3 Syndicate Ownership and Loan quality

Our objective is to explore how the ownership of syndicated loans varies following changes in the loans' regulatory ratings. We start exploring who owns shares in loans with different regulatory ratings. This gives an initial idea of the dynamics because all loans can be presumed to be in good standing at issuance. Figure 3 shows that different regulatory ratings are associated with ownership by different types of lenders. Mutual funds and hedge funds hold larger shares of lower rated loans, while banks and CLOs are more likely to own shares of loans with strong regulatory ratings. Consistent with the different regulatory constraints that become binding only for non-investment-grade loans, CLOs tend to hold a larger share of Special Mention loans than banks.

This evidence suggests that there may be considerable turnover in syndicates as the loan quality deteriorates. To provide more direct evidence, we examine the secondary market behavior of different types of lenders. Specifically, we study which types of lenders sell and which others enter in the syndicate by purchasing loan shares after a downgrade.

Sellers of Deteriorating Loans We investigate whether specific types of institutions are more likely to dismiss loans of different quality and whether sales are consistent with our priors on the effects of regulatory constraints. We estimate the following regression at the loan share level:

$$Sale_{ijt} = \alpha_{it} + \sum_{\substack{Rating_{it-1} \in \{Pass_{it-1}, \\ Special\ Mention_{it-1}, \\ Substandard_{it-1}, \\ Doubtful_{it-1}, \\ Loss_{it-1}\}}} \sum_{\substack{Lendertype_j \in \\ \{Bank, \\ CLO, \\ Mutual\ Fund, \\ Hedge\ Fund\}}} \beta_{Lender,Rating} Lendertype_j \times Rating_{it-1} + \mathbf{X} + \epsilon_{ijt}, \tag{1}$$

where $Sale_{ijt}$ is an indicator variable that is equal to 1 if financial institution j in quarter t sells part or all of its share in loan i and takes value zero if the institution owned shares in the loan at $t-1$ and does not decrease its ownership share; $Lendertype_j$ is a dummy variable capturing the type of institution j. The matrix $\mathbf{X}$ includes interactions of loan and quarter fixed effects (α_{it}), which absorbs all loan-specific characteristics in a given quarter. In particular, α_{it} allow us to control non-parametrically for the loan quality. It also controls for the loan's lifecycle and the fact that the original lenders may want to divest in the years following the origination.

Figure 4 plots the estimated coefficients and the 95% confidence intervals of the interaction terms between the non-pass ratings and institution types in equation 1. It is evident that banks sell deteriorating loans, with sales concentrated on Special Mention, Substandard, and Loss ratings. CLOs also sell loans with Substandard and Loss ratings. CLOs are about 1 percentage points more likely to sell Substandard loans, an economically significant magnitude compared to the 9.6 percent average probability of any lender selling loans with a Substandard regulatory rating. The probability of a sale by a CLO increases by an additional 2.2 percentage points for Doubtful loans, which have a 12.5 percent average probability of being sold by any lender. In contrast, mutual funds do not reduce their holdings of deteriorating loans; hedge funds are less likely to sell their

shares in Loss-rated loans. Overall, Figure 4 confirms that because of the regulatory constraints they face, banks and CLOs are more likely to dismiss deteriorating loans than other intermediaries.

Buyers of Deteriorating Loans We also explore which types of institutions purchase loan shares in the secondary market and how their behavior varies with the quality of the loan. We limit the sample to institutions that purchase shares in loan i at any time during our sample period and test whether institutions of a given type are more likely to buy shares of loans with different regulatory ratings. In particular, we estimate the following regression:

$$\begin{aligned}\text{Institution Purchase}_{ijt} =& \alpha_i + \theta_t + \beta_1 \text{ Special Mention}_{it-1} + \beta_2 \text{ Substandard}_{it-1} \\ &+ \beta_3 \text{ Doubtful}_{it-1} + \beta_4 \text{ Loss}_{it-1} + \gamma X_{it} + \epsilon_{ijt},\end{aligned} \tag{2}$$

where Institution Purchase$_{ijt}j \in \{Bank, CLO, Mutual\ Fund, Hedge\ Fund\}$ is an indicator variable denoting the purchase of a share in loan i by institution j of a given type in quarter t; the dummy takes value equal to one if the institution of given type has increased its share of loan i at time t and is set equal to zero for other types of buyers, $-j$. In practice, we test whether new entrants are more or less likely to be a bank, a CLO, a mutual fund, or a hedge fund relative to other buyers of the same loan in a given quarter. We include loan fixed effects (α_i) to absorb loan unobserved heterogeneity and time fixed effects (θ_t) to control for macroeconomic factors, including aggregate funding conditions.[4] The vector of controls X_{it} also includes interactions of lead arranger and year and of the borrower's industry and year fixed effects. In this way, we control for syndicate quality and shocks to the quality of the loans arranged by a given lender as well as industry shocks affecting the loan's performance.

Table 3 shows the estimates of equation 2. Banks are less likely to purchase Special Mention loans; similarly, CLOs are less likely to purchase Special Mention and Substandard loans. This evidence supports the notion that regulated lenders have incentives not to hold deteriorating loans. Mutual funds instead increase their participation in the

[4]Since we observe too few new buyers in the syndicate in a give quarter, we are unable to include interactions of loan and time fixed effects, as we do in the sales regressions.

syndicate of loans with a Special Mention or Substandard regulatory rating; also hedge funds increase their participation in Substandard loans. These effects are not only statistically, but also economically significant. For instance, in column 1 of Panel A, the average probability that a mutual fund is the buyer of a loan share is 34.8 percent. This probability increases by 2.2 percentage points (6.3 percent) for Special Mention loans and by 3.2 percentage points (9.2 percent) for Substandard loans.

Panel B of Table 3 focuses on current syndicate members and asks which ones increase their shares. It is apparent that mutual funds that are already in the syndicate increase their shares, while the purchases of hedge funds are largely driven by newcomers. We observe less churning in Doubtful and Loss loans. This finding suggests that it is hard to find new buyers for the lowest quality loans, but it must be interpreted with caution because Doubtful and Loss loans are just 1.2 percent and 0.5 percent of the sample, respectively.

In sum, the identity of the top owner of a syndicated loan may change as a result of the churning following regulatory downgrades. To explore whether this is the case, we consider a simpler empirical model, in which we collapse all regulatory downgrades in a dummy that takes a value equal to one if a loan has been downgraded in any of the previous three quarters; the dummy variable is equal to zero otherwise.

Regulatory Downgrades and Top Owner We test whether loans that have been downgraded in the previous three quarters are more likely to experience a change in the top owners than other loans, by regressing a dummy that takes value one if a loan has a top owner of a given type (e.g., a bank) on loan fixed effects and the downgrade dummy.

Tables 4 shows that banks, which are widely believed to monitor the loan and lead renegotiations, become less likely to be the top owner of a loan that has been downgraded in the three quarters following the downgrade. Instead, mutual funds are more likely to become the top owners of loans that have been recently downgraded. The estimates also show that most of the ownership reallocation occurs in the three quarters following the loan downgrade, as the dummy that takes value equal to one if a downgrade occurred since four quarters or more is typically statistically insignificant.

Overall, the evidence that banks are less likely to be the top owners of downgraded

loans raises the question of whether the new owners have incentives to renegotiate and monitor the borrower or if they instead amplify the initial shocks to credit quality.

Regulatory Downgrades and Syndicate Concentration Having shown that regulatory rating downgrades of syndicated loans lead to a reallocation of the shares between different types of lenders, we ask whether the syndicate structure changes in a way that may hamper or favor renegotiation. In particular, mutual funds and hedge funds may not have skills and resources needed for the loan renegotiation. In this case, we would expect them to purchase small shares in deteriorating loans bottom-fishing for bargain prices in order to take advantage of banks and CLOs that are forced to liquidate. The arrival of hedge funds and mutual funds may make renegotiation more difficult if the loan ownership becomes more dispersed because the new lenders would internalize externalities on other lenders to a lower extent.

On the other hand, the new lenders could have stronger incentives to renegotiate than previous owners if at least some participants in the syndicate accumulate shares leading to a more concentrated loan ownership.

To explore how the reallocation of the loan shares affects the ownership structure of the loan, we estimate the following regression at the loan-quarter level:

$$\text{Concentration Measure}_{it} = \alpha_i + \theta_t + \beta\ \text{Downgrade}_{it-1} + \gamma X_{it} + \epsilon_{it}, \tag{3}$$

where $\text{Concentration Measure}_{it}$ is either the logarithm of number of lenders, the number of lenders owning 50 percent of the loan, the total share held by the largest 10 lenders, the largest loan share, or the HHI of loan shares in loan i in quarter t. Downgrade_{it-1} is a dummy that takes value equal to one if a loan has a loan has been downgraded in the last three quarters. We include loan fixed effects (α_i) and time fixed effects (θ_t). The vector of controls X_{it} contains interactions of lead arranger and year and of borrower industry and year fixed effects. The coefficients on the downgrade dummy allows us to test how the ownership structure of a loan varies as its credit quality deteriorates.

Table 5 shows that loans become more concentrated when their quality deteriorates according to all our concentration proxies. For instance, in column 1, a downgrade appears to reduce the number of lenders by about 1 percent. Similarly, we observe a

1 percent increase in the HHI following a downgrade. This finding suggests that the reallocation of shares does not necessarily hamper renegotiation. Since the syndicate concentration increases, the new owners may have incentives to internalize externalities and to attempt to cure the loan.

If concentration indeed increases to favor renegotiation, we would expect the increase in ownership concentration to be more pronounced for loans that would be particularly inefficient to liquidate or that would otherwise be difficult to renegotiate. To evaluate whether this is the case, we investigate how the quarterly change in the number of borrowers varies in the three months following a downgrade for borrowers with different characteristics. Table 6 shows the results for subsamples. As in the earlier specifications, we include loan fixed effects as well as interactions of arranger and time and of industry and time fixed effects.

To explore cross-sectional differences between loans, we split borrowers based on industry characteristics, which we compute as the median characteristic of the borrower's two-digit NAICS industry from S&P Compustat. While it would be possible to perform the match at the borrower level, this would drastically reduce our sample and the number of downgraded loans we can consider. Considering the characteristics of the borrower's industry allows us to include unlisted borrowers, which are the large majority in our sample, and to have a sufficiently large sample of downgraded loans.

In our empirical tests, we split the sample in borrowers with each industry characteristic above and below the median. We conjecture that it would be particularly inefficient not to renegotiate loans to borrowers that have high cash-flow volatility. A downgrade of these loans is likely to have occurred because the borrowers experienced temporary difficulties. For these loans, a higher syndicate concentration and any form of renegotiation are most likely to be beneficial. Columns 2 and 3 show that, consistent with this conjecture, loans to borrowers with higher cash flow volatility experience a larger decrease in the number of lenders than other loans following a downgrade.

Lack of renegotiation and liquidation are particularly costly for borrowers with relatively more intangible assets and R&D expenses. Columns 4 to 7 show that the drop in number of lenders following a downgrade is particularly pronounced for these loans.

Finally, columns 8 and 9 split the sample based on the borrowers leverage at $t-1$.

The drop in number of lenders is somewhat more pronounced in borrowers with lower leverage, as lenders may not have strong incentives to concentrate the ownership when the expected recovery rate is too low.

When lead banks that typically monitor the borrower and are expected to conduct negotiations with the borrowers have exited, the new owners need strong incentives to replace them and take efficient decisions. Therefore, we expect an increase in the ownership concentration of the syndicate to be particularly desirable. Understanding whether an increase in the concentration of loan shares indeed occurs is particularly important in the light of recent evidence showing that lead arrangers often divest their entire loan shares (Blickle et al. 2020). Table 7 shows that indeed the ownership concentration of deteriorating loans increases to a larger extent when the lead arrangers have retained a smaller share of the loan. This is the case whether we consider the lead bank's current share or the lead bank's share at origination. In column 1, a high lead bank share at origination appears to substitute for syndicate concentration as the ownership of downgraded loans in which the lead banks have maintained a large share becomes more dispersed, even if the effect is small from an economic point of view.

Overall, these results suggest that the concentration of deteriorating loans increases to favor renegotiation, especially when liquidation costs would be particularly high or lenders would otherwise find hard to coordinate. In the next section, we explore how the syndicate concentration affects loan outcomes and under what conditions shocks to credit quality are likely to be amplified.

4 Syndicate Concentration and Loan Outcomes

Our objective is to explore how the changes in ownership structure we have documented so far affect future loan outcomes. Establishing causality is challenging because only loans with better prospects may attract lenders that are willing to take large shares. We thus need to exploit exogenous variation in ownership concentration and study loan outcomes when potential lenders' ability to increase their loan shares is inhibited.

We conjecture that lenders that have recently experienced deterioration in the credit quality of unrelated parts of their loan portfolio are unlikely to be able to purchase

large shares of deteriorating loans, independently of the loans' future prospects. First, potential buyers that have already been hit by downgrades are likely to face financing constraints and to fear redemptions. Second, as Kempf, Manconi, and Spalt (2016) argue for institutional investors' ability to monitor their equity investments, investors that have experienced other negative shocks to their portfolios may be too busy in dealing with their problematic loans to engage with other borrowers. For these reasons, we view lenders with portfolio loans that have already been downgraded as unable to favor the syndicate's concentration.

We capture the deterioration of credit quality in unrelated parts of a lender's portfolio by considering whether a lender's loans to other industries experienced a downgrade. We define industries at the 2-digit NAICS level. By considering a coarse industry classification to measure a lender's portfolio exposure to downgrades in other industries, we limit concerns that downgrades in other industries may be informative about a loan's industry and its performance as broad industry aggregate are less likely to be interconnected. We consider a participant in the secondary market to be financially constrained during this quarter if at least one loan in its portfolio has been downgraded during the previous quarter.

We consider only one loan downgrade to define a lender as financially constrained, because the portfolio size distribution of syndicated loan market participants is heavily skewed. Many investors in syndicated loans purchase loan shares as an addition to their portfolios: The average number of loans per lender-quarter is 19 and the median 4, while the largest portfolio has 1099 different loan shares in a quarter. The number of loans in a lender's portfolio varies by lender type: for mutual funds, the mean (median) is 16 (4), for CLOs 43 (12), for banks 11 (2), and for hedge funds 3 (2).[5] While the number of loans in a lender's portfolio may appear to be low, two factors must be taken into account. First, the SNC sample does not cover the universe of syndicated loans, but only those that are held by at least 3 supervised institutions. Second, many lenders diversify their portfolios across asset classes and syndicated loans are only one of the asset classes they invest in.

We consider secondary market participants that held loans to borrowers in a particular

[5]The respective maximum number of shares is 1099 for Mutual Funds, 640 for CLOs, 1006 for banks, and for 224 hedge funds.

2-digit industry in the past as potential lenders. Our measure of financial constraints prevailing in a 2-digit industry during a quarter is the share of industry lenders that experienced at least one downgrade of other portfolio loans to borrowers in unrelated industries during the previous quarter. Specifically, we measure the share of lenders in industry l affected by downgrades as

$$\text{Downgrade Share}_{lt} = \frac{\text{Number of Lenders with Downgrades}_{-lt}}{\text{Total Number of Lenders}_{t}}$$

.

We consider all lenders, not only mutual funds and hedge funds, in the definition of the share of lenders that previously lent to a particular industry and that experience distress. The reason is that distress in other industries may increase the propensity of banks and CLOs to sell their shares in deteriorating loans. An increase in the number of loans being liquidated and financial constraints for potential buyers make the frictions we study even more relevant.[6]

Table 8 explores whether our measure of financial constraints can capture the way in which the secondary market for syndicated bank loans works. We test whether loans shares are less likely to be reallocated following downgrades in industries and quarters in which more potential industry lenders are financially constrained. We control for industry level shocks by including interactions of 2-digit NAICS industry and year fixed effects. Thus, our estimates capture whether shares in downgraded loans are less likely to be reallocated following quarters in which potential lenders' portfolios are performing less well, holding industry-level economic conditions within the year constant.

We find that indeed the reallocation of loan shares in the secondary market is inhibited when a large share of market participants has experienced downgrades in unrelated parts of their portfolios during the previous quarter. A one-standard-deviation increase in downgrade share (equivalent to 0.056) reduces the probability that a new syndicate member enters the syndicate by 0.219 percentage points, a large value compared to the mean (0.048) and standard deviation (0.21) of the dependent variable, Buy. The probability that a loan share is sold decreases by 19.9 percent, again a large value in comparison

[6]Our conclusions are invariant if we consider only mutual funds and hedge funds in defining the share of lenders that previously lent to a particular industry that experience distress.

to the unconditional mean of this variable of 7.6 percent.

Table 8 supports the narrative that financial constraints affect the secondary markets for syndicated bank loans. Financial constraints could thus prevent buyers from concentrating the ownership of deteriorating loans and provide the exogenous variation we need to identify the effects of ownership concentration on loan outcomes, as long as distress in unrelated industries affects loan outcomes only through ownership concentration. We expect ownership concentration to matter only for loans that have experienced downgrades, because coordination problems between creditors are severe only in non-performing loans. Therefore, the share of industry lenders that have experienced a downgrade should not matter for loans with a Pass rating. This allows us to test the exclusion restriction.

Table 9 supports this assumption. The downgrade share is unrelated to changes in the terms of loans that are not downgraded. This suggests that distress of other portfolio loans does not capture economic conditions in closely related industries and lenders' propensity to renegotiate a loan if not through the loan's ownership structure. It is therefore unlikely that potential buyers do not purchase large shares and fail to concentrate the syndicate because of negative expectations on the loans outcomes. Instead, downgrades in unrelated industries affect the syndicate concentration because potential buyers face financial constraints and can allocate a smaller than usual part of their portfolio to purchases in the secondary loan market. Put differently, variation in syndicate concentration due to financial constraints can be viewed as affecting the prospects of deteriorating loans only through their ownership structure. We can thus use our proxy for financing constraints to generate exogenous variation in syndicate concentration and explore the causal effect of the latter on loan outcomes.

We use the share of lenders experiencing downgrades as an instrument for the number of lenders in the first stage. Specifically, we study how the syndicate concentration of loan i to a borrower in industry l in quarter t varies after a downgrade when a large share of potential lenders experiences downgrades in other industries $(-l)$.

$$\text{Number of Lenders}_{it-1} = \gamma_1 \text{ Downgrade Share}_{it-2} + \gamma_2 \text{ Log (Size)}_{it-1} + \delta X_{it} + \epsilon_{it} \quad (4)$$

The matrix of controls X_{it} includes arranger, industry-year, loan age, and bank internal rating fixed effects.

We then estimate the second stage using the share of lenders experiencing downgrades as an instrument for the number of lenders and estimate the following equation:

$$\text{Outcome}_{it} = \beta_1 \widehat{Number\ of\ Lenders}_{it-1} + \beta_2 \text{ Log (Size)}_{it-1} + \gamma X_{it} + \epsilon_{it} \tag{5}$$

where Outcomes_{it} is an outcome for loan i in quarter t. We consider the following loan outcomes: refinancing, amendments, amount changes, internal downgrades by the agent bank, internal notches downgraded by the agent bank, or whether experiences no further regulatory downgrades. Our variable of interest is $\text{Number of Lenders}_{it-1}$. The vector X_{it} contains controls fo arranger, industry-year, loan age, and bank internal rating fixed effec. In particular, the industry-year fixed effects capture negative shocks leading to the deterioration of all loan within an industrys and allow us to exploit only cross-sectional differences in the financial constraints of financiers across loans over time.

More precisely, the identifying assumption is that distress in unrelated industries does not help to predict future loan outcomes once we control for aggregate shocks including time fixed effects and for industry conditions absorbed by interactions of industry and year fixed effects. In particular, by including the latter, we capture variation in deteriorating loans' concentration deriving from the fact that loans that exhibit signs of distress and are downgraded in quarters in which intermediaries have already experienced downgrades are likely to remain less concentrated than other loans in the industry downgraded in other quarters within the same year. The precise timing of the loan downgrade within a year is unlikely to predict future industry conditions and loan performance.

Table 10 shows the results from estimating equation 4. It is apparent that loans that are downgraded have more lenders when a large fraction of potential buyers has experienced downgrades in unrelated industries. A one-standard-deviation increase in the share of industry lenders experiencing downgrades (equal to 0.067) increases the number of lenders by 1.6; similarly, going from the 10th (0.146) to the 90th (0.307) percentile of our proxies for financial constraints yields an increase in the number of lenders of 3.9. The first stage estimates thus confirm that financial constraints of potential lenders are negatively associated with deteriorating syndicates concentration.

The instrumental variable estimates in Table 10 indicate that a higher number of

lenders decreases the probability that a loan is refinanced or amended, for instance, because the maturity is lengthened. The amount of loans with a larger number of lenders is also more often revised upward, rather than downwards, suggesting that missed interest payments are more likely to be capitalized, instead of being waived. Arguably as a result of the intransigent behavior of large syndicates, borrowers experience worse performance, as captured by an increase in the probability of future loan downgrades. Borrowers with large syndicates are also downgraded a larger number of notches.

The estimated effects are not only statistically, but also economically significant. Figure 1 suggests that a syndicate shrinks by five lenders after a regulatory downgrade to Substandard. Without this reduction the estimated probability of an amendment decreases by almost 3 percentage points. This effect is economically large as the unconditional probability of an amendment is 4 percent. Similarly, without concentration (a reduction by five lenders after a downgrade), the probability of a future downgrade increases by nearly 4 percentage points compared to an unconditional probability of 7 percent. Not only are loans more likely to be downgraded, but the downgrade are also more severe: We estimate 0.1 notches downgrades for loans that remain dispersed compared to an unconditional average of 0.12 rating notches.

One possible concern with this interpretation of the empirical evidence is that while the median loan has eight lenders and a drop of one or two lenders may facilitate coordination, the sample includes very large syndicates. The average syndicate has 72 lenders and the top quartile has more than 62 lenders. Coordination in these large syndicates may be carried out by the largest syndicate participants. For our interpretation of the empirical evidence to extend to these large syndicates, we would expect that the number of lenders that own a substantial portion of the loan shrinks.

Table A2 explores how the number of lenders that own 50% of a downgraded loan evolves depending on financial constraints and the effect of the number of lenders on the future loan outcomes. In our sample, on average 8 lenders own half of a loan. The top quartile of lenders is 11. Not only do the estimates confirm our earlier findings in Table 10, but the estimated effects of the number of lenders that own half of the loan are typically larger, as is consistent with our intuition.

We finally explore to what extent the identify of large lenders matters for deterio-

rating loans. Table 11 shows that ownership concentration affects loan outcomes favors renegotiation when banks are unlikely to take a leadership role because they are not the top owners.

5 Conclusion

We show that the exit of banks and CLOs from the syndicate of deteriorating loans does not necessarily imply an amplification of the initial shock to the loan's credit quality. Other lenders in the secondary market for syndicated loans appear to have the skills and incentives to help cure loans in early phases of distress. In particular, mutual funds and hedge funds purchase shares in deteriorating loans that banks and CLOs sell for regulatory reasons. With their purchases, mutual funds and hedge funds contribute to increasing the concentration of the syndicate. Concentration in turn appears to favor renegotiation, especially when banks are no longer the largest owners. As a consequence, the loans are more likely to be amended and less likely to experience future downgrades.

However, we also show that these stabilizing forces encounter obstacles in periods of widespread distress. Potential lenders that have already been exposed to distress because of the downgrade of other loans in their portfolios are unable to engage in other syndicates of deteriorating loans or to buy as large shares. As a consequence, they buy smaller shares or some small lenders find it optimal not to exit the syndicate. Deteriorating syndicates remain more disperse and loans experience worse future performance.

Our paper has important implications for evaluating the consequences of bank capital requirements and CLOs' regulations on financial stability. It indicates that the financial strength of all participants in the syndicated loan market must be evaluated. Regulation-induced sales by banks and CLOs can have larger systemic effects if also the mutual funds and the hedge funds participating in this market are constrained.

References

Beyhaghi, Mehdi, Ca Nguyen, and John K. Wald. 2019. "Institutional investors and loan dynamics: Evidence from loan renegotiations." *Journal of Corporate Finance* 56:482–505.

Blickle, Kristian, Quirin Fleckenstein, Sebastian Hillenbrand, and Anthony Saunders. 2020. "The Myth of the Lead Arranger Share." FRB of New York Staff Report No. 922.

Bolton, Patrick and David S. Scharfstein. 1996. "Optimal Debt Structure and the Number of Creditors." *Journal of Political Economy* 104 (1):1–25.

Brunner, Antje and Jan Pieter Krahnen. 2008. "Multiple Lenders and Corporate Distress: Evidence on Debt Restructuring." *The Review of Economic Studies* 75 (2):415–442.

Chava, Sudheer and Michael Roberts. 2008. "How does Financing Impact Investment? The Role of Debt Covenants." *Journal of Finance* 63 (5):2085–2121.

Chodorow-Reich, Gabriel and Antonio Falato. forthcoming. "The Loan Covenant Channel: How Bank Health Transmits to Nonfinancial Firms." *Journal of Finance* .

Cohen, Gregory J., Melanie Friedrichs, Karam Gupta, William Hayes, Seung Jung Lee, W. Blake Marsh, Nathan Mislang, Maya Shaton, and Martin Sicilian. 2018. "The U.S. Syndicated Loan Market: Matching Data." Finance and Economics Discussion Series 2018-085. Board of Governors of the Federal Reserve System (U.S.).

Cordell, Larry, Michael R. Roberts, and Michael Schwert. 2021. "CLO Performance." Federal Reserve Bank of Philadelhia Working Paper 20-48.

Denis, David J. and Jing Wang. 2014. "Debt covenant renegotiations and creditor control rights." *Journal of Financial Economics* 113 (3):348–367.

Drucker, Steven and Manju Puri. 2008. "On Loan Sales, Loan Contracting, and Lending Relationships." *The Review of Financial Studies* 22 (7):2835–2872.

Elkamhi, Redouane and Yoshio Nozawa. 2020. "Fire-Sale Risk in the Leveraged Loan Market." Rotman School of Management Working Paper No. 3635086.

Financial Stability Board. 2019. "Vulnerabilities associated with leveraged loans and collateralised loan obligations." Tech. rep., Financial Stability Board.

Gilson, Stuart C., Kose John, and Larry H.P. Lang. 1990. "Troubled debt restructurings: An empirical study of private reorganization of firms in default." *Journal of Financial Economics* 27 (2):315–353.

Hotchkiss, Edith S. and Robert M. Mooradian. 1997. "Vulture investors and the market for control of distressed firms." *Journal of Financial Economics* 43 (3):401–432.

Irani, Rustom, Rajkamal Iyer, Ralf R. Meisenzahl, and Jose-Luis Peydro. 2021. "The Rise of Shadow Banking: Evidence from Capital Regulation." *Review of Financial Studies* 34 (5):2181–2235.

Irani, Rustom M. and Ralf R. Meisenzahl. 2017. "Loan Sales and Bank Liquidity Management: Evidence from a U.S. Credit Register." *Review of Financial Studies* 30 (10):3455–3501.

Ivanov, Ivan and James Wang. 2019. "The Effect of Supervisory Loan Ratings on Syndicated Lending." Working Paper.

Ivashina, Victoria, Benjamin Iverson, and David C. Smith. 2016. "The ownership and trading of debt claims in Chapter 11 restructurings." *Journal of Financial Economics* 119 (2):316–335.

Jiang, Wei, Kau Li, and Wei Wang. 2012. "Hedge Funds and Chapter 11." *The Journal of Finance* 67 (2):513–560.

Kempf, Elisabeth, Alberto Manconi, and Oliver Spalt. 2016. "Distracted Shareholders and Corporate Actions." *The Review of Financial Studies* 30 (5):1660–1695.

Kothari, S., D. Blass, A. Cohen, S. Rajpal, and SEC Research Staff. 2020. "U.S. Credit Markets Interconnectedness and the Effects of the COVID-19 Economic Shock." Tech. rep., US Securities and Exchange Commission Staff Report.

Loumioti, Maria and Florin P. Vasvari. 2019. "Portfolio performance manipulation in collateralized loan obligations." *Journal of Accounting and Economics* 67 (2):438–462.

Roberts, Michael R. 2015. "The role of dynamic renegotiation and asymmetric information in financial contracting." *Journal of Financial Economics* 116 (1):61–81.

Roberts, Michael R. and Amir Sufi. 2009. "Control Rights and Capital Structure: An Empirical Investigation." *Journal of Finance* 64 (4):1657–1695.

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

Figure 1: Changes in Syndicate Concentration after Loan Downgrades

This figure shows the evolution of the mean and median number of lenders after a loan's downgrade to "Substandard", which occurs well before to default. Zero refers to the time of the downgrade; we then plot the number of lenders in the event time.

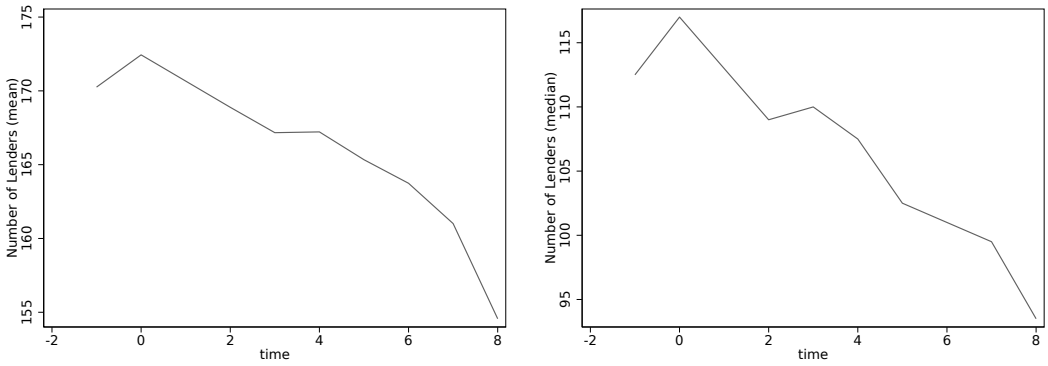

Figure 2: Regulatory and Agent Bank Internal Ratings

This figure shows the distribution of the internal bank ratings converted to S&P ratings for loans with different regulatory ratings.

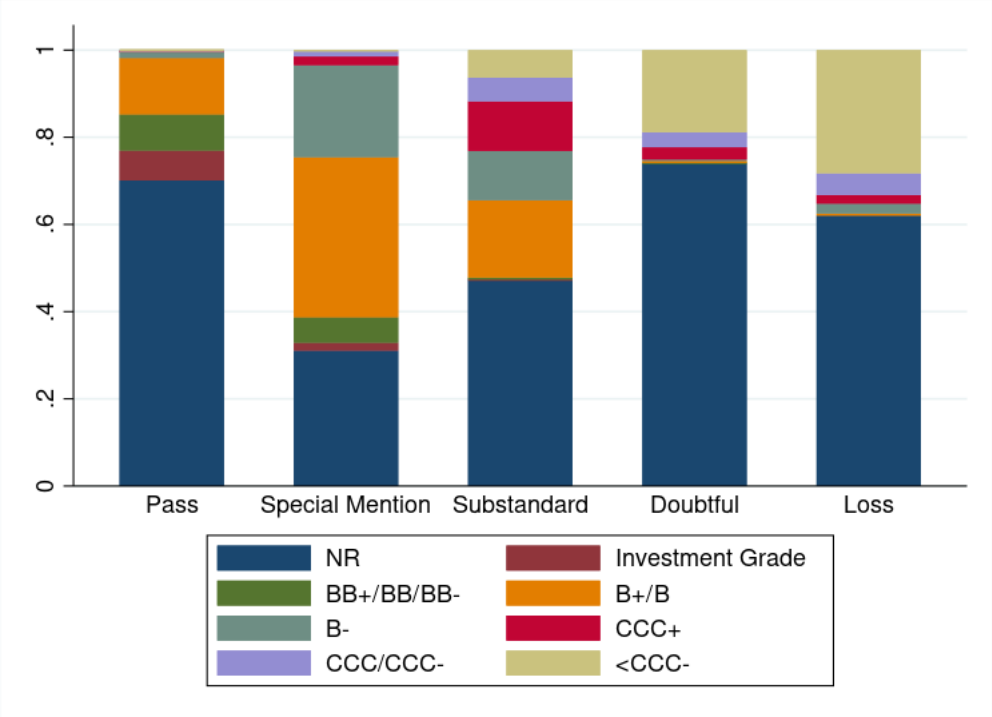

Figure 3: Lender Type by Rating

This figure shows the types of financial institutions that hold shares of syndicated loans with different regulatory ratings. The best regulatory rating is "Pass", indicating no issues with the loan, followed by "Special Mention", "Substandard", "Doubtful", and "Loss".

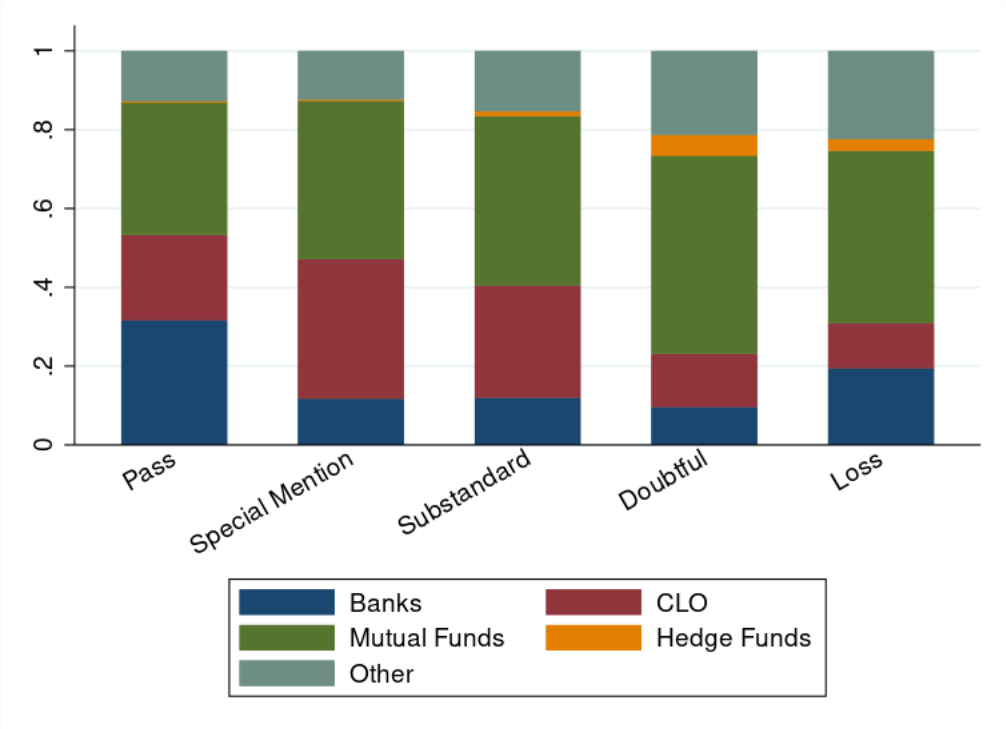

Figure 4: Sales by Institution Type and Rating

This figure plots the point estimates and confidence intervals of the coefficients on the interaction between each regulatory rating and institution type resulting from estimating equation 1.

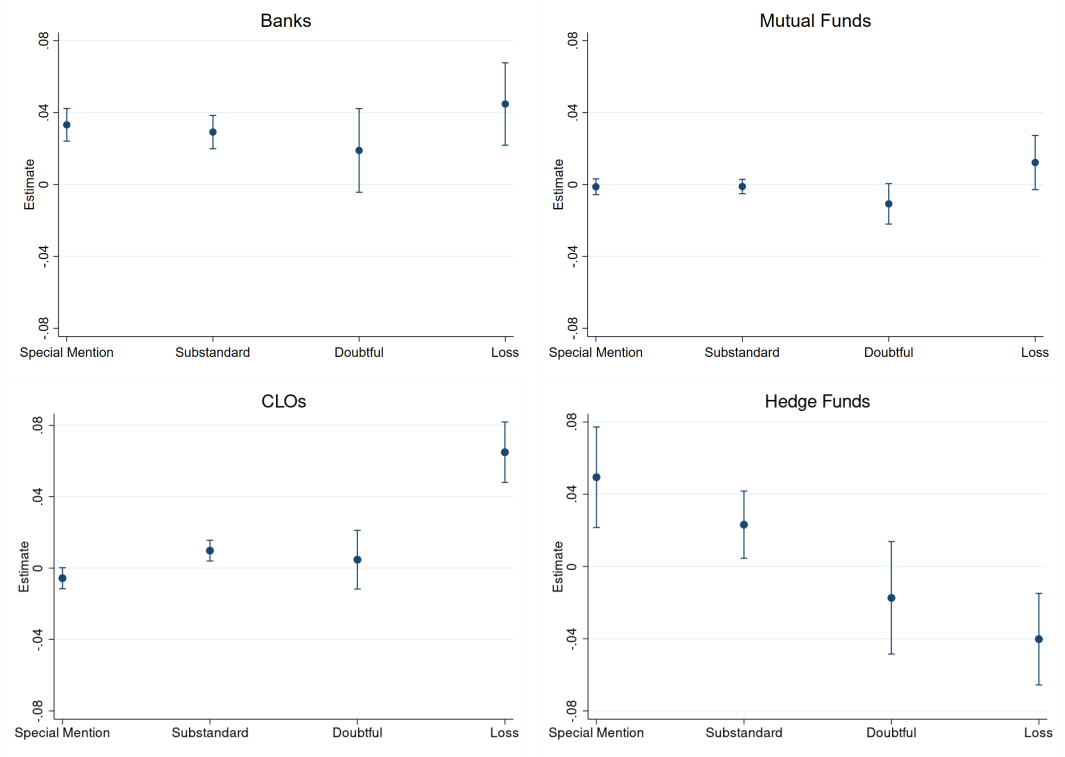

Table 1
Summary Statistics

This table presents the summary statistics for all variables used in the analysis. Bank Buy is an indicator variable if an institution that has purchased or increased its stake in a loan at time t is a bank, the variable takes value equal zero if the institution is not a bank and is defined only for participants that have purchased loan shares in quarter t. CLO Buy, Mutual Fund Buy and Hedge Fund Buy are defined analogously but for CLOs, mutual funds, and hedge funds, respectively. Bank, CLO, Mutual Fund, Hedge Fund are indicator variable that equal one if a share owner is a bank, , CLO, mutual fund or hedge fund, respectively Special Mention, Substandard, Doubtful, and Loss are indicator variable if a loan has regulatory rating Special Mention, Substandard, Doubtful, or Loss, respectively.

	N	Mean	SD	25p	median	p.75
Lender Share Variables						
Bank Buy	666543	0.04	0.20	0	0	0
CLO Buy	666543	0.43	0.49	0	0	1
Mutual Fund Buy	666543	0.35	0.48	0	0	1
Hedge Fund Buy	666543	0.01	0.07	0	0	0
Sale	8674486	0.09	0.29	0	0	0
Bank	8674486	0.06	0.23	0	0	0
CLO	8674486	0.35	0.48	0	0	0
Mutual Fund	8674486	0.36	0.32	0	0	0
Hedge Fund	8674486	0.00	0.05	0	0	0
Loan-Level Variables						
Special Mention	118119	0.06	0.24	0	0	0
Substandard	118119	0.07	0.26	0	0	0
Doubtful	118119	0.01	0.07	0	0	0
Loss	118119	0.01	0.07	0	0	0
Number of Lenders	118119	72.07	151.74	4	8	62
Log Amount	118119	18.56	1.57	17.69	18.68	19.58
Maximum Share	118119	0.29	0.21	0.11	0.24	0.43
Top 10 Share	118119	0.80	0.29	0.58	1	1
Lender HHI	118119	2166.10	1927.98	519.69	1621.49	3400
Refinance	118119	0.01	0.11	0	0	0
Amendment	118119	0.04	0.18	0	0	0
Amount Adjustment	118119	0.15	0.36	0	0	0
Pos. Amount Adjustment	118119	0.03	0.17	0	0	0
Neg. Amount Adjustment	118119	0.12	0.32	0	0	0
Downgrade	35022	0.07	0.25	0	0	0
Notches Downgraded	35022	0.12	1.13	0	0	0
Downgrade Share-other Lenders (SP and Sub)	118118	0.20	0.05	0.17	0.20	0.23
Downgrade Share-other Lenders (Any)	118118	0.21	0.06	0.18	0.21	0.24
Downgrade Share-Industry Lenders (SP and Sub)	118118	0.06	0.07	0.01	0.04	0.09
Downgrade Share-Industry Lenders (Any)	118118	0.06	0.07	0.01	0.04	0.10
MF/HF Downgrade Share (SP and Sub)	118118	0.21	0.06	0.16	0.22	0.24
MF/HF Downgrade Share (Any)	118118	0.22	0.06	0.19	0.22	0.25
MF Downgrade Share(SP and Sub)	118118	0.21	0.06	0.17	0.22	0.25
MF Downgrade Share (Any)	118118	0.22	0.06	0.20	0.23	0.5

Table 2
Rating Transition Matrix

This table shows the probability that loans with a given rating are upgraded or downgraded.

	Last Quarter Rating				
	Pass	Special Mention	Substandard	Doubtful	Loss
Pass	0.981	0.108	0.055	0.068	0.024
Special Mention	0.013	0.790	0.032	0.006	0.009
Substandard	0.005	0.100	0.878	0.083	0.022
Doubtful	0.001	0.004	0.029	0.787	0.060
Loss	0.000	0.002	0.008	0.063	0.898

Table 3
Loan Share Purchases and Increases

This table presents fixed effect panel regressions for loan share purchases. In panel A, the dependent variable is a purchase dummy for loan i by institution j at time t that takes value equal to one if a given institution of the type indicated on top of each column purchase a loan share; the dummy is set equal to zero for other institutions of different types that purchase shares in the loan at time t. In Panel B, we consider only institutions that already own share in the loan at $t-1$; the indicator variable Increase takes value one if the institution that increases its loan share is of a given type, as indicated on top of each column. All independent variables are lagged one period. We include time, arranger-year, industry-year and loan fixed effects. Standard errors in parentheses are clustered by loan and industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Bank	Mutual Fund	CLO	Hedge Fund
	(1)	(2)	(3)	(4)
	Panel A: Loan Share Purchases			
Special Mention	-0.00312**	0.0217***	-0.0286***	0.000880
	(0.00142)	(0.00583)	(0.00649)	(0.000742)
Substandard	-0.0000881	0.0320***	-0.0504***	0.00285**
	(0.00170)	(0.00725)	(0.00832)	(0.00118)
Doubtful	0.00640	-0.00601	-0.0125	0.000567
	(0.00432)	(0.0204)	(0.0278)	(0.00540)
Loss	-0.00944	-0.0353	0.0218	0.0104
	(0.0268)	(0.0362)	(0.0353)	(0.0152)
Loan FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Arranger-Year FE	YES	YES	YES	YES
Industry-Year FE	YES	YES	YES	YES
Observations	666543	666543	666543	666543
R^2	0.285	0.119	0.116	0.045
	Panel B: Loan Share Increases			
Special Mention	-0.00687**	0.0206*	-0.0157	-0.000375
	(0.00288)	(0.0107)	(0.0109)	(0.00161)
Substandard	0.00133	0.0434***	-0.0560***	0.00215
	(0.00359)	(0.0117)	(0.0123)	(0.00258)
Doubtful	0.0130	0.0320	-0.106***	0.0143
	(0.0111)	(0.0265)	(0.0244)	(0.00885)
Loss	-0.000792	0.0658	-0.162***	-0.000975
	(0.0189)	(0.0547)	(0.0458)	(0.0306)
Loan FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Arranger-Year FE	YES	YES	YES	YES
Industry-Year FE	YES	YES	YES	YES
Observations	193284	193284	193284	193284
R^2	0.242	0.176	0.236	0.130

Table 4
Largest Owners of Shares in the Syndicate

This table summarizes fixed effect panel regression results of loan-level regressions with a indicator variable that is equal to 1 if the largest share is held by a bank (column 1), a CLO (column 2), a mutual fund (column 3), or a hedge fund (column 4) for loan i at time t as the dependent variable. Downgrade is a dummy variable that takes value equal to one if a loan has been downgraded in the last three quarter (that is, between $t-4$ and $t-3$, between $t-3$ and $t-2$, or between $t-2$ and $t-1$ and zero otherwise. Downgrade 4+ is a dummy variable that is equal to one if a loan was downgraded at quarter $t-4$ or earlier. We include time, arranger-year, industry-year, and loan fixed effects. Standard errors in parentheses are clustered by loan and industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Bank	CLO	Mutual Fund	Hedge Fund
	(1)	(2)	(3)	(4)
Downgrade	-0.0105***	0.00183	0.00773**	0.000373
	(0.00276)	(0.00153)	(0.00318)	(0.000449)
Downgrade 4+	-0.0137*	0.00171	0.0106	-0.00182
	(0.00759)	(0.00497)	(0.0103)	(0.00139)
Loan FE	Yes	Yes	Yes	Yes
Lead-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	118110	118110	118110	118110
R^2	0.85	0.72	0.81	0.73

Table 5
Syndicate Concentration and Loan Downgrades

This table summarizes fixed effect panel loan-level regressions with concentration measures for loan i at time t as the dependent variable. Downgrade is a dummy variable that takes value equal to one if a loan has been downgraded in the last three quarter(that is, between $t-3$ and $t-2$, between $t-2$ and $t-1$, or between $t-1$ and t and zero otherwise). We include time, arranger-year, industry-year and loan fixed effects. Standard errors in parentheses are clustered by loan and industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Log Number of Lenders		Number of Lenders Owning 50%	Top 10	Max Share	HHI
	(1)	(2)	(3)	(4)	(5)	(6)
Downgrade	-0.0130***	-0.0149***	-0.370***	0.00347***	0.00277***	25.62***
	(0.00220)	(0.00214)	(0.0587)	(0.000486)	(0.000481)	(4.015)
Loan FE	Yes	Yes	Yes	Yes	Yes	Yes
Lead-Year FE	No	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	No	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	118119	118110	118110	118110	118110	118110
R^2	0.993	0.994	0.962	0.989	0.976	0.981

Table 6
Cross-Sectional Differences in Syndicate Concentration Changes after Downgrades

This table summarizes fixed effect panel regression on the change in the number of lenders after a downgrade in the last 3 quarters. Specifically, Downgrade is a dummy variable that takes value equal to one if a loan has been downgraded in the last three quarters (that is, between $t-3$ and $t-2$, between $t-2$ and $t-1$, or between $t-1$ and t and zero otherwise). All independent variables are lagged one period. We split the sample in firms with the characteristic on top of each column above or below the median. Characteristics are computed as 2007 two-digit NAICS industry-level medians. Standard errors in parentheses are clustered by industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1) All	(2) Low CF Vol	(3) High CF Vol	(4) Low Tangibility	(5) High Tangibility	(6) Low R&D	(7) High R&D	(8) Low Lev	(9) High Lev
Downgrade	-1.433**	-1.188	-1.778**	-1.796**	-1.432*	-0.290	-2.222***	-1.781**	-1.486**
	(0.571)	(0.752)	(0.877)	(0.881)	(0.783)	(0.716)	(0.821)	(0.900)	(0.740)
Loan FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	95550	51389	42611	47337	46670	44923	49078	41385	52575
R^2	0.365	0.404	0.351	0.393	0.357	0.404	0.360	0.394	0.355

Table 7
Changes in Syndicate Concentration and Lead Banks' Shares

This table summarizes fixed effect panel regression on the change in the number of lenders after a downgrade in the last 3 quarters. Specifically, downgrade is a dummy variable that takes value equal to one if a loan has been downgraded in the last three quarter (that is, between $t-3$ and $t-2$, between $t-2$ and $t-1$, or between $t-1$ and t and zero otherwise). All independent variables are lagged one period. We split the sample in firms with the characteristic on top of each column above or below the median.The sample is restricted to loans that were downgraded at some point in time. Standard errors in parentheses are clustered by industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	High Lead Share	Low Lead Share	High Orig. Lead Share	Low Orig. Lead Share
	(1)	(2)	(3)	(4)
Downgrade	0.206*	-2.649***	-1.055*	-2.031*
	(0.113)	(0.911)	(0.568)	(1.132)
Loan FE	Yes	Yes	Yes	Yes
Lead-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	48327	46525	35560	33879
R^2	0.611	0.370	0.307	0.364

Table 8
Syndicate Composition Changes and Financial Constraints

We consider lenders' propensity to buy a loan share, increase increase an existing loan share, sell a loan share, or decrease an existing loan share. Indicators variable are defined for all the owners of a loan at t and $t-1$. The regression uses all observations (loans that were downgraded at some time and loans that were never downgraded loans.) The dummy variable Buy takes value equal to one if a syndicate member at t was not a syndicate member at $t-1$. The dummy variable Increase takes value equal to one if a syndicate member's share of the loan (loan share of member in dollar at t/loan size in dollar at t) increased between $t-1$ to t and the syndicate member was already part of the syndicate at $t-1$ (that is, its loan share at $t-1$ was larger than zero). Sale is a dummy variable that takes value equal to one if a syndicate member at $t-1$ is no longer a syndicate member at t and zero otherwise. Decrease is a dummy variable that takes value equal to one if a syndicate member's share of the loan (loan share of member in dollar at t/loan size in dollar at t) decreased between $t-1$ and t, but the syndicate member remains part of the syndicate at t (that is, the loan share of the member at t is larger than zero.) Downgrade share is the share of industry lenders that experienced downgrades in other industries from $t-2$ to $t-1$. Standard errors in parentheses are clustered by industry-quarter. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

	(1)	(2)	(3)	(4)
	Buy	Increase	Sale	Decrease
Downgrade Share	-3.910***	-0.127**	-3.560***	0.00129
	(0.513)	(0.0580)	(0.364)	(0.0513)
Lead-Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	9603150	9603150	9603150	9603150
R^2	0.014	0.003	0.022	0.004

Table 9
Exclusion restriction test - The Effect of Syndicate Concentration on "Pass" Rated Loans

This table summarizes fixed effect panel regression results with loan outcomes for loan i at time t as the dependent variable. Downgrade share is the share of industry lenders that experienced downgrades in other industries from $t-2$ to $t-1$. All independent variables are lagged one period. The sample is restricted to loans that were always rated "Pass" by supervisors. We include industry-year effects, arranger fixed effect, internal bank ratings fixed effects and loan age fixed effects. Standard errors are clustered at the industry-quarter level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Amount	Pos. Amount	Neg. Amount		Notches	60 Days
	Refinance	Amendment	Change	Change	Change	Downgrade	Downgraded	Past Due
Downgrade Share	0.00396	0.00327	0.00581	-0.00343	0.00923	0.0256	-0.0508	0.00230
	(0.00574)	(0.0127)	(0.0212)	(0.0110)	(0.0172)	(0.0322)	(0.118)	(0.00518)
Log Loan Size	0.000735**	-0.000291	-0.0410***	0.00434***	-0.0454***	0.00115	0.0102**	0.000470**
	(0.000293)	(0.000652)	(0.00214)	(0.000542)	(0.00216)	(0.00135)	(0.00470)	(0.000233)
Arranger FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Rating FE	YES	YES	YES	YES	YES	YES	YES	YES
Loan Age FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	85961	85961	85961	85961	85961	19841	19841	85961
R^2	0.442	0.087	0.090	0.037	0.107	0.304	0.769	0.026

Table 10
The Effects of Syndicate Concentration on Deteriorating Loans' Outcomes

This table summarizes fixed effect panel instrumental variable regression results with loan outcomes for loan i at time t as the dependent variable and the share of lenders having experienced a downgrade in their portfolio as instrument for the number of lenders. All independent variables are lagged one period. The sample is restricted to loans that were downgraded at some point in time. Standard errors in parentheses are clustered by industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Amount	Pos. Amount	Neg. Amount		Notches	No Further
	Refinance	Amendment	Change	Change	Change	Downgrade	Downgraded	Reg Downgrade
Number of Lenders	-0.000962**	-0.00580**	0.00126	0.00471***	-0.00345**	0.00773**	0.0211**	-0.00372*
	(0.000453)	(0.00258)	(0.00167)	(0.00163)	(0.00155)	(0.00303)	(0.00922)	(0.00226)
Log Loan Size	0.0594**	0.365**	-0.102	-0.305***	0.202**	-0.525**	-1.453**	-0.241*
	(0.0291)	(0.166)	(0.107)	(0.104)	(0.0999)	(0.204)	(0.624)	(0.145)
First Stage								
Downgrade Share	24.464***	24.464***	24.464***	24.464***	24.464***	30.267***	30.247***	24.464***
	(6.252)	(6.252)	(6.252)	(6.252)	(6.252)	(11.107)	(11.107)	(6.252)
Log Loan Size	64.356***	64.356***	64.356***	64.356***	64.356***	67.926***	67.926***	64.356***
	(1.535)	(1.535)	(1.535)	(1.535)	(1.535)	(2.174)	(2.174)	(1.535)
Arranger FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
S&P Rating FE	YES	YES	YES	YES	YES	YES	YES	YES
Loan Age FE	YES	YES	YES	YES	YES	YES	YES	YES
F-Statistic	15.31	15.31	15.31	15.31	15.31	7.42	7.42	15.31
Observations	29030	29030	29030	29030	29030	13821	13821	29030

Table 11
Top Owner Identity and Loan Refinancing

We slip the sample between downgraded loans with a bank and non bank top owners and present instrumental variable regressions of the effect of the number of owners on the probability that a downgraded loan is refinanced. All independent variables are lagged one period. The sample is restricted to loans that were downgraded at some point in time. Standard errors in parentheses are clustered by industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)
	Bank	Not Bank	Bank	Not Bank
Number of Lenders	-0.000610	-0.00107**		
	(0.000682)	(0.000529)		
Lender owning 50 percent			-0.00370	-0.00621**
			(0.00401)	(0.00284)
Log(Amount)	0.0190	0.0732*	0.0132	0.0491**
	(0.0208)	(0.0380)	(0.0139)	(0.0241)
First Stage				
Downgrade	24.26**	25.40***	3.99***	4.36***
	(10.14)	(7.61)	(1.48)	(1.05)
Log(Amount)	30.54***	71.92***	3.47***	8.47***
	(2.23)	(1.73)	(0.25)	(0.24)
Macro Controls	Yes	Yes	Yes	Yes
Arranger FE	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes
Loan Age FE	Yes	Yes	Yes	Yes
Fstat	5.72	11.15	7.29	17.37
Observations	6576	22439	6576	22439

Table A1
Lenders' Portfolio Characteristics

This table summarizes the distribution of loan shares across lender types. Lenders are counted on the individual level—that is, not aggregated to the bank holding company or group level. The category Others includes pension funds, insurance companies, finance companies, and asset managers. We also show the Herfindahl index of the funds' portfolio shares across industries.

	Average Number of Loan Shares per Lender					
	N	Mean	SD	25p	median	75p
All Lenders	69,837	13.56	35.46	1.00	2.4	8.71
Banks	5,501	8.12	33.49	1.00	1.99	4.33
CLOs	15,124	30.14	58.97	1.00	4.83	22.34
Mutual Funds	21,584	12.34	26.37	1.4	3.4	10.72
Hedge Funds	1,254	3.29	8.26	1.00	1.67	3.31
Others	26,374	6.68	17.66	1.00	1.75	4.56
	Average Lender Industry HHI					
All Lenders	3,389,955	0.26	0.24	0.11	0.16	0.29
Banks	230,595	0.38	0.30	0.14	0.25	0.51
CLOs	1,134,243	0.18	0.16	0.10	0.12	0.18
Mutual Funds	1,445,070	0.27	0.23	0.12	0.18	0.31
Hedge Funds	21,491	0.59	0.31	0.31	0.52	1
Others	558,556	0.36	0.30	0.14	0.23	0.50

Table A2
Number of Large Owners and Deteriorating Loans' Outcomes

This table summarizes fixed effect panel instrumental variable regression results with loan outcomes for loan i at time t as the dependent variable and the share of lenders having experienced a downgrade in their portfolio as instrument for the number of lenders that own 50% of the loan. All independent variables are lagged one period. The sample is restricted to loans that were downgraded at some point in time. Standard errors in parentheses are clustered by industry-quarter. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Refi	Amendment	Amount Change	Post. Amount Change	Neg. Amount Change	Downgrade	Notches Downgraded	No Further Reg Upgrade
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lenders owning 50 percent	-0.00565**	-0.0314**	0.0112	0.0297***	-0.0185**	0.0408***	0.114***	-0.0221*
	(0.00238)	(0.0130)	(0.00986)	(0.00925)	(0.00863)	(0.0125)	(0.0382)	(0.0128)
Log(Amount)	0.0404**	0.230**	-0.107	-0.228***	0.121*	-0.335***	-0.964***	0.169*
	(0.0181)	(0.0984)	(0.0746)	(0.0697)	(0.0656)	(0.102)	(0.313)	(0.0976)
First Stage								
Downgrade Share	4.21***	4.21***	4.21***	4.21***	4.21***	5.83***	5.83***	4.21***
	(0.82)	(0.82)	(0.011)	(0.82)	(0.82)	(1.48)	(1.48)	(0.80)
Log Loan Size	7.60***	7.60***	7.60***	7.60***	7.60***	8.24***	8.24***	7.60***
	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)	(0.0.30)	(0.30)	(0.21)
Arranger FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Statistic	26.74	26.74	26.74	26.74	26.74	15.53	15.53	26.74
Observations	29030	29030	29030	29030	29030	13821	13821	29030