

# Ownership Concentration and Performance of Deteriorating Syndicated Loans\*

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## Abstract

Banks are widely believed to have an information advantage, but regulation forces them to sell deteriorating loans, potentially hampering renegotiation and amplifying the initial negative shock to the borrower. We study to what extent the secondary market affects loan outcomes after an initial shock to credit quality. We show that banks, together with CLOs, sell downgraded loans to unregulated financial institutions. The reallocation of loan shares favors the syndicate's concentration, increases lenders' incentives to renegotiate and substitutes lenders' specialization. However, during periods of generalized distress, when potential buyers experience financial constraints, the secondary market fails to reallocate loan shares and syndicate ownership remains dispersed. We show that subsequently loans are less likely to be amended and more likely to be downgraded even further.

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# 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](#); [Elkamhi and Nozawa 2022](#)). It has been somewhat neglected that the same frictions could amplify negative shocks to credit quality further undermining the resilience of the credit market.

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 vital 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](#); [Falato and Liang 2016](#); [Denis and Wang 2014](#)). Loans that are traded in the secondary market impose particularly restrictive ex ante conditions on borrowers ([Drucker and Puri 2008](#)) further increasing the importance of renegotiation. Increasing reliance on incurrence covenants in covenant-lite loans ([Bräuning, Ivashina, and Ozdagli 2022](#)) could make creditors' ability and willingness to renegotiate before covenant violations and outside of creditors' control states even more important for borrowers' performance.

Renegotiation is typically led by banks ([Beyhaghi, Nguyen, and Wald 2019](#)), which are believed to have an information advantage over other syndicate participants ([Sufi 2007](#); [Ivashina 2009](#)). However, banks 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. These effects may be exacerbated by the fact that CLOs, which together with banks hold over half of the syndicated loans, face contractual arrangements that lead them to sell deteriorating loans. 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 unregulated financial institutions, including mutual funds and hedge funds, replace banks and CLOs when the quality of the loan deteriorates. By holding diversified portfolios, mutual funds and hedge funds could simply profit from the undervaluation of the distressed assets they purchase, even if the initial shock to the borrower's credit quality is amplified. It is thus important to study whether the reallocation of loan shares hampers renegotiation.

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. In Panel A, before being downgraded to substandard, the median loan has over 100 lenders and after the downgrade, we observe a drop in the number of lenders of about 20%. While the number of lenders in Panel A may still appear high several periods after the downgrade, any renegotiation is most likely to be carried out by the largest lenders that own a significant share of the loan. For this reason, in Panel B, we consider the minimum number of creditors owning 50% of the loan. These large lenders are presumably most involved in any renegotiation efforts. Panel B shows that while at the time of the downgrade the median loan has about 16 such large lenders, the number drops by about 50% in the following quarters. 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 have stronger incentives to monitor and perform due diligence ([Sufi 2007](#); [Gustafson, Ivanov, and Meisenzahl 2021](#)), which are crucial to efficiently renegotiate loan terms.

We investigate whether a concentrated structure indeed favors renegotiation. We start by showing 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 they purchase, but having experienced the deterioration of other portfolio loans, they may face redemptions and not be able to deal with a large number of loans in distress. Put differently, intermediaries that typically purchase deteriorating loans may have limited financial or organizational 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 negative shocks to other parts of their portfolios for reasons that are arguably unrelated to the borrower's quality.

The financial and organizational 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 through 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, our instrument does 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 an industry's loans are downgraded as unrelated to the loans' future 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. Importantly, ownership concentration appears to improve loan outcomes especially when the syndicate lacks specialized top lenders, such as lead banks or other lenders that have gained experience in dealing with distressed loans.

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 associated with an increase in syndicate concentration and that lenders with sufficiently large shares of the loans can substitute lead banks, independently from their past experience.

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 Krahen \(2008\)](#) 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 potential buyers' 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 \(2022\)](#)) 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 \(2022\)](#), 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, further 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 totaling \$20 million 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.<sup>1</sup> 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 observe the universe of loan shares, lenders, and any changes in ownership that occur over our sample period. The lead bank often continues to report even if there are no longer three supervised institutions in the syndicate, limiting selection problems. Moreover, to the extent banks retain loans that they expect to perform better, any selection problems would work against finding a positive effect of ownership concentration on loan outcome.

We use SNC to construct measures of loan ownership concentration and secondary market trading behavior. We concentrate on term loans because credit lines are seldom reallocated in the secondary loan market. Our sample includes 12,013 term loans held by at least 3 supervised institutions in the U.S. between 2009Q4 and 2019Q4. The vast majority of those are rated below investment grade; hence, the sample predominantly includes leveraged loans.

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. \(2021\)](#) and the hedge fund classification used in the Financial Accounts of the United States based on Form ADV.<sup>2</sup> Overall, we observe 12,108,437 loan shares (or 295,328 per quarter on average). The sample includes 69,828 unique lenders, of which 21,131 are classified as mutual funds and also include private funds that are run by banks and asset managers for qualified clients. Most mutual funds investing in syndicated bank loans are classified as “high yield” or “credit opportunity”; hence, the mutual funds in our sample do not merely invest in bank loans. The sample also include 2,312 hedge funds. The category “Others” comprises 25,815 lenders and includes, in order of importance, pension funds, insurance companies, finance companies (including Business Development Companies and “loan funding LLCs”), and university endowments.

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<sup>1</sup>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>.

<sup>2</sup>We thank Youngsuk Yook and Keely Adjorlolo for sharing their hedge fund identification.

Table 1 summarizes the main variables we use in the analysis.<sup>3</sup>

**Regulatory Ratings** Besides banks' internal ratings, SNC provides us with loans' 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:<sup>4</sup>

- **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 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.

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<sup>3</sup>Table A1 in the appendix shows some characteristics of lenders' portfolios distinguishing by lender type.

<sup>4</sup>For more details and definitions, see <https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20151105a1.pdf>



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, and regulatory ratings. The loan internal ratings have a much finer scale than regulatory ratings. In what follows, we will use the internal ratings to create an alternative measure of loan performance.

**Regulated Financial Intermediaries** Banks with loans 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.<sup>5</sup> 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. As noted before, banks may also have incentives to sell Special Mention loans to avoid fire sales prices in case of further downgrades.

Even though they are not exposed to as stringent capital requirements as banks, CLOs are also subject to contractual constraints 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 loans that capital constrained banks sell (Cordell, Roberts, and Schwert 2021). However, they have to pass overcollateralization and interest rate coverage tests to guarantee, respectively, the principal and interest payments of the notes

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<sup>5</sup>For details on the supervisory process and consequences, see Ivanov and Wang (2019).

they issue. CLOs also face constraints aiming to ensure a certain portfolio quality. Most 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. As a consequence, CLO managers face strong disincentives for to hold or invest in CCC+ or lower rated loans, defaulted loans, bridge loans, subordinated debt, or equity (Harmon and Ivashina 2020).

The constraints imposed on CLOs' portfolios have been shown to affect CLOs' trading behavior and to lead to fire sales (Financial Stability Board 2019; Kothari et al. 2020). 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 2022). Even though the constraints faced by CLOs are tied to agency ratings, not to regulatory ratings, 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 the changes in the composition of the syndicate 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-rated 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 explore how loan shares are reallocated after a downgrade.

**Buyers of Deteriorating Loans** Irani et al. (2021) show that banks that are subject to capital constraints tend to sell risky loans. We explore which types of institutions purchase loan shares in the secondary market depending on the quality of the loan. Starting from the current owners of a loan, we ask which syndicate members increase their shares. In particular, we estimate the following regression:

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

where  $\text{Institution Purchase}_{ijt}$ ,  $j \in \{Bank, CLO, Mutual Fund, Hedge Fund\}$  is an indicator variable denoting a share increase in loan  $i$  by institution  $j$  of a given type in quarter  $t$ ; the dummy takes value equal to one if the institution of a given type has increased its share of loan  $i$  at time  $t$  and is set equal to zero for other types of owners,  $-j$ . In practice, we test whether buyers are more 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 ( $\alpha_i$ ) to absorb loan unobserved heterogeneity and time fixed effects ( $\theta_t$ ) to control for macroeconomic factors, including aggregate funding conditions. The vector of controls  $X_{it}$  also includes interactions of lead arranger and year and of the borrower’s industry and year fixed effects.<sup>6</sup> 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 1. It is apparent that banks and CLOs do not increase their shares in loans that are rated below pass, while mutual funds and hedge funds do so. Interesting, hedge funds appear to increase their share ownership also in the riskier Doubtful loans, indicating that they are more inclined to take risk.

Panel B considers the type of institutions that enter in the syndicate of deteriorating loans. For this purpose, we consider all institutions that purchase shares in loan  $i$  at any

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<sup>6</sup>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.

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 using the same empirical model as in Panel A. Banks are less likely to enter the syndicates of 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 and hedge funds instead enter the syndicates of loans with a Special Mention or Substandard regulatory rating. These effects are not only statistically, but also economically significant. For instance, in column 1 of Panel B, 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.

**Regulatory Downgrades and Top Owners** While we have shown that the syndicate composition of deteriorating loans changes towards unregulated institutions, it is important to understand whether the top owner of a syndicated loan also changes as a result of the churning following regulatory downgrades. The largest owners are those that are likely to lead any renegotiation efforts and to coordinate with the other syndicate participants. It is an empirical question whether these incentives can substitute for bank specialization and information advantage.

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 previously; the dummy variable is equal to zero otherwise.

We test whether loans that have been previously downgraded 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 a dummy capturing whether a loan has been downgraded in any of the previous periods.

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. While not statistically significant, the point estimates suggest that if anything, mutual funds are more likely to become the top owners of loans that have been recently

downgraded.

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.

Alternatively, 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. In this case, we would expect renegotiation to occur in a timely fashion after a regulatory downgrade to address the deficiencies pointed out by regulators. Hence, we would expect concentration to already increase shortly after the downgrade.

For this reason, we explore how the reallocation of the loan shares affects the ownership structure of the loan in the three quarters following a downgrade. We estimate the following regression at the loan-quarter level:

$$\begin{aligned} \text{Change in Concentration Measure}_{it|t-3} = & \beta \text{Downgraded}_{it} \\ & + \alpha_i + \theta_t + \gamma X_{it} + \epsilon_{it}, \end{aligned} \tag{2}$$

where  $\text{Change in Concentration Measure}_{it|t-3}$  is the change in either the number of lenders, the (minimum) number of lenders owning 50 percent of the loan, the total share held by the largest 10 lenders, and the largest loan share in loan  $i$  from quarter  $t - 3$  to quarter  $t$ .  $\text{Downgrade}_{it}$  is a dummy that takes value equal to one if a loan had been downgraded

between quarter  $t - 3$  and quarter  $t$ . We include loan fixed effects ( $\alpha_i$ ) and time fixed effects ( $\theta_t$ ). The vector of controls  $X_{it}$  also 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, consistent with Figure 1. For instance, in column 1, downgrades appear to reduce the number of lenders three times more than the sample average change in lenders. This translates in to reduction by 1.3 lenders over three quarters compared to a mean (median) number of lenders of 72(8). 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 cure the loan. While a decrease of 1.3 lenders may seem small relative to an average number of lender of 72, we note that the median loan has only 8 lenders and the exit of one or two creditors may favor the coordination of the remaining lenders.

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 change in the number of lenders varies for borrowers that are most likely to require a timely renegotiation.

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.

Table 6 shows the results. 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. 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. Therefore, a higher syndicate concentration and any form of renegotiation are most likely to be beneficial. Columns 1 and 2 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 3 to 6 show that the drop in number of lenders following a downgrade is particularly pronounced for these loans.

We also explore whether syndicate concentration can be a substitute for the lack of specialized lenders. Specifically, when lead banks, which typically monitor the borrower and are expected to conduct negotiations, 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 current share 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. In contrast, loans with low lead share exhibit more concentration after a downgrade (column 2), consistent with the need to reduce renegotiation frictions within the syndicate. Using the lead share at origination, we also find more concentration after downgrades for loans with low lead shares (column 3 and 4).

We also consider that the market for distressed loans consists of few specialized lenders ([Eckbo, Kai, and Wang 2022](#)). These lenders if they hold large shares could substitute lead banks. In Table 8, we thus split the sample based on the extent to which the top holder appears to be specialized in dealing with distressed loans. We define a lender's

specialization based on the share of downgraded loans in its portfolio. In columns 1 and 2, we split the sample based on this proxy for the top lender’s specialization being above or below the median. In columns 3 and 4, we consider the extent to which the top holders matured experience in dealing with distressed loans in the same industry as loan  $i$ . We thus consider the top lender’s portfolio share of downgraded loans in the same industry as loan  $i$  over the previous two years. According to both definitions, the estimates consistently indicate that the syndicate concentration increases to a larger extent when the top lender has lower specialization in dealing with syndicated loans, suggesting that the incentives of creditors in a concentrated syndicate can substitute for the lenders’ experience.

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 a 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 because broad industry aggregate are less likely to be interconnected.

We define 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).<sup>7</sup> 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 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

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

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<sup>7</sup>The respective maximum number of shares is 1099 for Mutual Funds, 640 for CLOs, 1006 for banks, and for 224 hedge funds.

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.<sup>8</sup>

In Table 9, we test whether loans shares are indeed 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 also control for shocks affecting the lead arranger portfolio by including interaction of lead bank and year fixed effects and for quarterly macroeconomic shocks with time fixed effects.

We find that indeed the reallocation of loan shares in the secondary market is inhibited when a large share of potential industry lenders 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 to the unconditional mean of this variable of 7.6 percent.

Table 9 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,

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<sup>8</sup>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.

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 10 supports this assumption. The downgrade share is unrelated to changes in the terms of loans that are not downgraded. This suggests that after controlling for interaction of industry and year fixed effects, arranger fixed effects, loan rating fixed effects, loan age (quarter of the loan issuance) fixed effects, and macroeconomic conditions within an year, using GDP growth and the VIX index, distress of other portfolio loans does not capture economic conditions in other 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 of deteriorating loans 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 potential 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 ( $-l$ ).

$$\text{Number of Lenders}_{it-1} = \gamma_1 \text{Downgrade Share}_{it-2} + \gamma_2 \text{Log (Size)}_{it-1} + \delta X_{it} + \epsilon_{it} \quad (3)$$

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

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 in the subsample of loans that are downgraded during the sample period:

$$\text{Outcome}_{it} = \beta_1 \widehat{\text{Number of Lenders}}_{it-1} + \beta_2 \text{Log (Size)}_{it-1} + \gamma X_{it} + \epsilon_{it} \quad (4)$$

where  $\text{Outcome}_{it}$  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.<sup>9</sup> Our variable of interest is  $\widehat{\text{Number of Lenders}}_{it-1}$ . As in the first stage, the vector  $X_{it}$  contains controls for arranger, industry-year, loan age, bank internal rating fixed effects as well as GDP growth and the VIX uncertainty index. In particular, the industry-year fixed effects capture negative shocks leading to the deterioration of all loans within an industry and allow us to exploit only cross-sectional differences in the financial constraints of financiers across loans in different quarters.

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 11 shows the results from estimating equation 3. 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

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<sup>9</sup>Unfortunately, information on secondary market loan prices available from commercial datasets is too sparse to allow an analysis of deteriorating loan performance. The problem arises because downgraded loans are about 25% of the sample and secondary market prices are available only for a small sample of loans.

negatively associated with deteriorating syndicates' concentration.

The instrumental variable estimates in Table 11 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 and are less likely to be upgraded even though the coefficient of interest in column 8 is not statistically significant at conventional levels.

The estimated effects are not only statistically, but also economically significant. On average, 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 downgrades 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 be valid for these large syndicates, we would expect that the number of lenders that own a substantial portion of the loan shrinks.

As noted before, any renegotiation is most likely to be carried out by the largest lenders that own a significant share of the loan. For this reason, in the appendix, we explore how the number of lenders that own 50% of a downgraded loan evolves depend-

ing on financial constraints and the effect of the number of lenders on the future loan outcomes (see Appendix, Table A2). 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 11, 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 concentration matters depending on the identity of the largest lenders in the syndicates of deteriorating loans. We start by splitting the sample by whether the largest lender is a bank or not a bank. We hypothesize that when a bank is the largest lender, it is likely to lead the renegotiation due its informational advantage. Other syndicate members are more likely to defer to the bank's judgement and hence, there is less potential for within-syndicate conflict. As a result, concentration should matter less when a bank is the largest lender in the syndicate.

We focus on a loan's refinancing, which is arguably the most important outcome of a renegotiation. Consistent with our hypothesis, Table 12 shows the results of IV regressions in the subsamples with and without top owners banks. We find that ownership concentration, measured as either the number of lenders or the number of lenders that together own 50 percent of the loan, favors the loan's refinancing especially when banks are unlikely to take a leadership role because they are not the top owners. The effect of ownership concentration is not statistically significant when banks are the top owners, even though differences between the two subsamples are not statistically significant.

Similarly, in Table 13 we split the sample based on the two proxies for top lender's specialization we considered in Table 8. We concentrate on the number of largest lenders that together hold 50% of the loan because this measure of concentration is arguably the most relevant for renegotiation. Consistent with our earlier findings, we find that a lower number of lenders matters most for the refinancing of a deteriorating loan when the top lender has less experience in dealing with risky loans.

Overall, these results suggest that the syndicate concentration can substitute for banks information advantage and lenders' experience suggesting that regulations that increase banks' propensity to sell deteriorating loans are unlikely to amplify negative shocks to the quality of the borrower, if others potential buyers are not financially constrained.

## 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 and 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.

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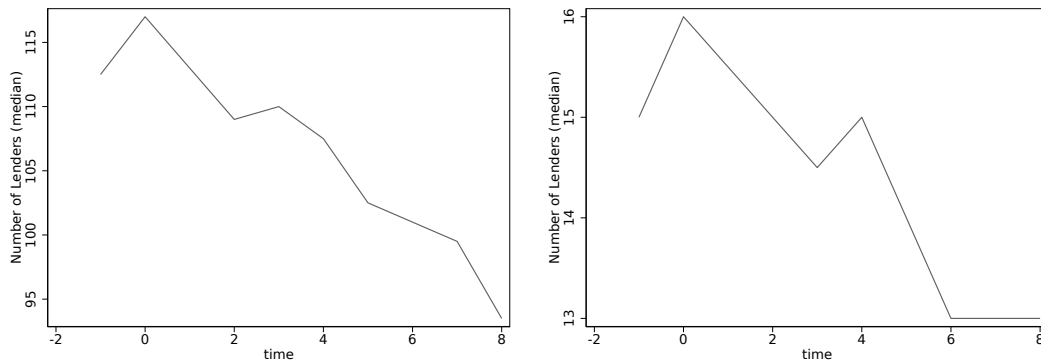
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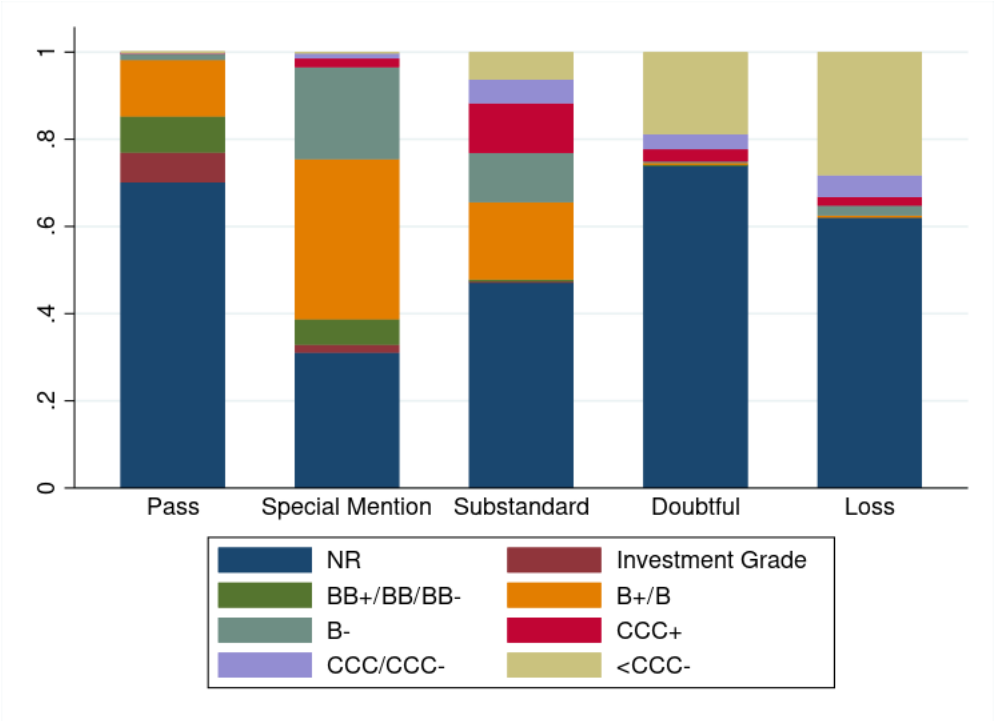
**Figure 1: Changes in Syndicate Concentration after Loan Downgrades**

Panel A of this figure shows the evolution of the median number of lenders after a loan's downgrade to "Substandard", which occurs well before to default. Panel B considers the number of largest lenders that own at least 50% of the loan and are presumably those most engaged in the renegotiation process. Zero refers to the time of the downgrade; we then plot the number of lenders (the number of largest lenders that own at least 50% of the loan) in the event time.



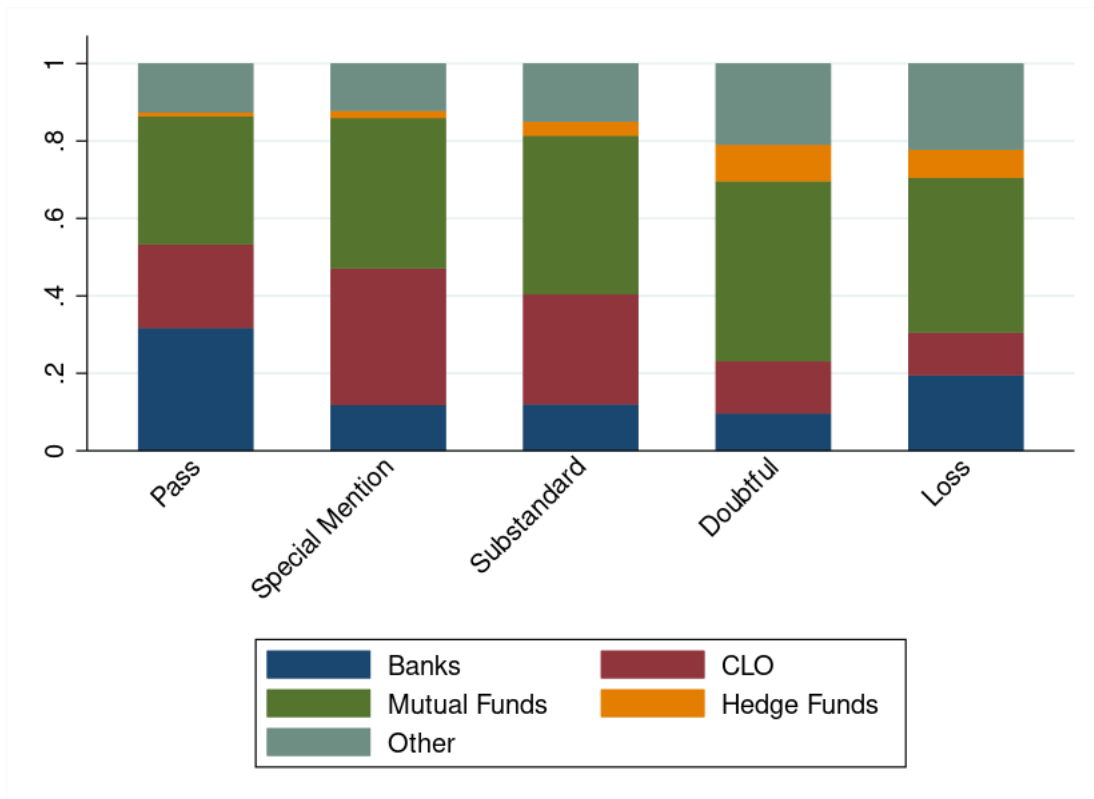
**Figure 2: Regulatory and Agent Bank Internal Ratings**

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”.



**Table 1**  
**Summary Statistics**

This table presents the summary statistics for all variables used in the analysis. Bank Buy is an indicator variable that takes value equal to one 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 Increase, CLO Increase, Mutual Fund Increase, Hedge Fund Increase are indicator variable that equal one if a bank, CLO, mutual fund or hedge fund, respectively, increase their loan shares. Special Mention, Substandard, Doubtful, and Loss are indicator variables that takes value one 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	0.05	0.21	0	0	0
CLO Buy	666543	0.43	0.49	0	0	1
Mutual Fund Buy	666543	0.33	0.47	0	0	1
Hedge Fund Buy	666543	0.02	0.13	0	0	0
Bank Increase	193284	0.09	0.29	0	0	0
CLO Increase	193284	0.39	0.49	0	0	1
Mutual Fund Increase	193284	0.39	0.49	0	0	1
Hedge Fund Increase	193284	0.03	0.16	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
Change in Number of Lenders	94597	-0.46	27.43	0	0	0
Change in Maximum Share	94597	-0.002	0.05	0	0	0
Change in Top 10 Share	94597	-0.001	0.05	0	0	0
Change in Lenders Owning 50 Percent	94597	0.33	5.49	0	0	0
Change in HHI	94597	-18.76	425.86	0	0	0
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

**Table 2**  
**Rating Transition Matrix**

This table shows the probability that loans with a given rating are upgraded or downgraded to any of the ratings listed in the first column.

	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**  
**Changes in Syndicate Composition**

This table presents fixed effect panel regressions to explore changes in syndicate composition following a downgrade. In panel A, we ask which types of institutions increase their loans shares. We consider institutions that already own share in the loan at  $t - 1$ ; the dependent variable is an indicator variable Increase that takes value one if the institution that increases its loan share is of a given type, as indicated on top of each column. In Panel B, 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  $t$ . 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 (1)	Mutual Fund (2)	CLO (3)	Hedge Fund (4)	Other (5)
Panel A: Loan Share Increases					
Special Mention	-0.00833** (0.00343)	0.0177* (0.0104)	-0.0159 (0.0109)	0.00639** (0.00290)	0.0000877 (0.00472)
Substandard	0.000346 (0.00458)	0.0325*** (0.0112)	-0.0564*** (0.0123)	0.0185*** (0.00417)	0.00508 (0.00545)
Doubtful	0.0105 (0.0123)	0.0100 (0.0256)	-0.110*** (0.0243)	0.0540*** (0.0137)	0.0355*** (0.0122)
Loss	-0.0122 (0.0242)	0.0441 (0.0704)	-0.163*** (0.0460)	0.0370 (0.0425)	0.0941*** (0.0316)
Loan FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Arranger-Year FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Observations	193284	193284	193284	193284	193284
$R^2$	0.259	0.168	0.235	0.130	0.094
Panel B: Loan Share Purchases					
Special Mention	-0.00264* (0.00153)	0.0194*** (0.00568)	-0.0286*** (0.00647)	0.00362** (0.00149)	0.00821** (0.00369)
Substandard	0.000719 (0.00180)	0.0253*** (0.00708)	-0.0508*** (0.00832)	0.00968*** (0.00230)	0.0151*** (0.00406)
Doubtful	0.00665 (0.00468)	-0.0105 (0.0210)	-0.0130 (0.0278)	0.00936 (0.00776)	0.00754 (0.0123)
Loss	-0.0184 (0.0273)	-0.0332 (0.0332)	0.0212 (0.0349)	0.0206 (0.0205)	0.00984 (0.0300)
Loan FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Arranger-Year FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Observations	666543	666543	666543	666543	666543
$R^2$	0.287	0.117	0.115	0.057	0.088

**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. Downgraded Previously is a dummy variable that takes value equal to one if a loan has been downgraded before. 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 (1)	CLO (2)	Mutual Fund (3)	Hedge Fund (4)	Other (5)
Downgraded Previously	-0.0149** (0.0065)	0.0033 (0.00465)	0.0083 (0.0084)	-0.0010 (0.0018)	0.005 (0.0073)
Loan FE	Yes	Yes	Yes	Yes	Yes
Lead-Year FE	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	118110	118110	118110	118110	118110
$R^2$	0.846	0.719	0.811	0.729	0.0750



**Table 5**  
**Syndicate Concentration and Loan Downgrades**

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

	Change in Lenders (1)	Change in Lenders (2)	Change in Lenders Owning 50 percent (3)	Change in Top 10 Share (4)	Change in Largest Share (5)
Downgrade	-1.365** (0.578)	-1.532*** (0.570)	-0.410*** (0.111)	0.00406*** (0.00109)	0.00295*** (0.00112)
Loan FE	Yes	Yes	Yes	Yes	Yes
Lead-Year FE	No	Yes	Yes	Yes	Yes
Industry-Year FE	No	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
$N$	94602	94597	94597	94597	94597
$R^2$	0.348	0.366	0.403	0.282	0.244

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

This table summarizes fixed effect panel regressions. The dependent variable is the change in the number of lenders after a downgrade in the last 3 quarters. 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. The sample is restricted to loans that were downgraded at some point in time. Standard errors in parentheses are clustered by industry-quarter. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Low CF Vol (1)	High CF Vol (2)	Low Tangibility (3)	High Tangibility (4)	Low R&D (5)	High R&D (6)
Downgrade	-1.232 (0.786)	-1.939** (0.850)	-1.952** (0.895)	-1.469* (0.771)	-0.371 (0.727)	-2.266*** (0.819)
Loan FE	Yes	Yes	Yes	Yes	Yes	Yes
Lead-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	50855	42224	46921	46167	44447	48626
$R^2$	0.405	0.353	0.395	0.358	0.403	0.362

**Table 7**  
**Changes in Syndicate Concentration and Lead Banks' Shares**

This table summarizes fixed effect panel regressions. The dependent variable is 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 (1)	Low Lead Share (2)	High Orig. Lead Share (3)	Low Orig. Lead Share (4)
Downgrade	0.0696 (0.0923)	-2.649*** (0.911)	-1.089* (0.598)	-2.282** (1.141)
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	47666	46525	35292	33690
$R^2$	0.616	0.370	0.308	0.365

**Table 8**  
**Changes in Syndicate Concentration and Top Lenders' Specialization**

This table summarizes fixed effect panel regressions. The dependent variable is 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. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Top Holder All		Top Holder Industry	
	Low (1)	High (2)	Low (3)	High (4)
Downgrade	-2.270** (0.965)	-1.355* (0.777)	-1.605* (0.958)	-1.355* (0.733)
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	44260	47534	45175	47300
$R^2$	0.440	0.469	0.420	0.506

**Table 9**  
**Syndicate Composition Changes and Financial Constraints**

We consider lenders' propensity to buy a loan share, 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*** (0.513)	-0.127** (0.0580)	-3.560*** (0.364)	0.00129 (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 10**  
**Exclusion restriction test - The Effect of Syndicate Concentration on “Pass” Rated Loans**

This table summarizes fixed effect panel regressions 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. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

	Refinance (1)	Amendment (2)	Amount Change (3)	Pos. Amount Change (4)	Neg. Amount Change (5)	Downgrade (6)	Notches Downgraded (7)	60 days Past Due (8)
Downgrade	0.00258 (0.00554)	0.00495 (0.0129)	0.00204 (0.0205)	-0.00178 (0.0109)	0.00382 (0.0168)	0.0167 (0.0321)	-0.0636 (0.118)	0.00264 (0.00507)
Log Loan Amount	0.000732** (0.000293)	-0.000289 (0.000652)	-0.0410*** (0.00214)	0.00434*** (0.000542)	-0.0454*** (0.00216)	0.00117 (0.00135)	0.0103** (0.00471)	0.000469** (0.000233)
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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	0.305	0.769	0.026

**Table 11**  
**The Effects of Syndicate Concentration on Deteriorating Loans' Outcomes**

This table summarizes fixed effect panel instrumental variable regressions 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. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Refi (1)	Amendment (2)	Amount Adjustment (3)	Post. Amount Adjustment (4)	Neg. Amount Adjustment (5)	Downgrade (6)	Downgrade Notches (7)	Upgrade (8)
Number of Lenders	-0.00106** (0.000495)	-0.00530** (0.00253)	0.00226 (0.00174)	0.00522*** (0.00179)	-0.00296** (0.00150)	0.00726*** (0.00262)	0.0194** (0.00798)	-0.00303 (0.00219)
Log(Amount)	0.0659** (0.0318)	0.333** (0.163)	-0.167 (0.112)	-0.338*** (0.115)	0.171* (0.0965)	-0.493*** (0.177)	-1.343** (0.541)	0.196 (0.141)
<i>First Stage</i>								
Downgrade Share	24.21*** (6.48)	24.21*** (6.48)	24.21*** (6.48)	24.21*** (6.48)	24.21*** (6.48)	33.91*** (11.34)	33.91*** (11.34)	24.21*** (6.48)
Log Loan Size	64.36*** (1.54)	64.36*** (1.54)	64.36*** (1.54)	64.36*** (1.54)	64.36*** (1.54)	67.92*** (2.17)	67.92*** (2.17)	64.36*** (1.54)
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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	13.95	13.95	13.95	13.95	13.95	8.94	8.94	13.95
Observations	29030	29030	29030	29030	29030	13821	13821	29030

**Table 12**  
**Top Owner Identity and Loan Refinancing**

We split 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	-0.001 (0.001)	-0.0011** (0.0005)		
Lenders owning 50 percent			-0.005 (0.004)	-0.006** (0.003)
Log(Amount)	0.029 (0.023)	0.074* (0.039)	0.017 (0.014)	0.050** (0.025)
<i>First Stage</i>				
Downgrade	25.44** (11.31)	27.32*** (8.26)	4.55*** (1.62)	4.66*** (1.13)
Log(Amount)	30.54*** (2.23)	71.93*** (1.74)	3.47*** (0.25)	8.47*** (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	5.06	10.93	7.89	17.07
Observations	6576	22439	6576	22439



**Table 13**  
**Lender Specialization and Syndicate Concentration**

We split the sample between downgraded loans with high and low presence of specialized owners, defined according to two definitions of specialized lender above and below the median. In columns 1 and 2, the top lender's specialization is defined based on the share of loans in a lender's portfolio that were downgraded over the last two years. In columns 3 and 4, the top lender's specialization is defined based on the share of loans in a lender's portfolio that were downgraded over the last two years and are in the same industry as loan  $i$ . We present instrumental variable regressions of the effect of the number of owners owning 50% of the loan 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. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Top Holder All		Top Holder Industry	
	Low (1)	High (2)	Low (3)	High (4)
Lenders owning 50 percent	-0.00593** (0.00272)	-0.00312 (0.00322)	-0.00327** (0.00158)	-0.0280 (0.0391)
Log(Amount)	0.0457** (0.0218)	0.0200 (0.0238)	0.0248* (0.0129)	0.199 (0.282)
<i>First Stage</i>				
Downgrade Share	5.23*** (1.25)	5.09*** (1.92)	5.23*** (1.25)	5.09*** (1.92)
Log(Amount)	7.96*** (0.25)	7.38*** (0.25)	7.96*** (0.25)	7.38*** (0.25)
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	17.39	7.04	17.39	7.04
Observations	14083	14937	14298	14721

**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	69,828	13.55	35.44	1.00	2.4	8.7
Banks	5,501	8.12	33.49	1.00	1.99	4.33
CLOs	15,070	30.19	59.00	1.00	4.85	22.43
Mutual Funds	21,131	12.41	26.43	1.4	3.4	10.86
Hedge Funds	2,312	4.85	13.48	1.00	1.8	3.83
Others	25,815	6.72	17.73	1.00	1.75	4.62
	Average Lender Industry Shares					
All Lenders	3,389,691	0.16	0.19	0.03	0.08	0.20
Banks	230,595	0.28	0.33	0.04	0.12	0.38
CLOs	1,131,623	0.11	0.18	0.02	0.06	0.13
Mutual Funds	1,410,924	0.18	0.25	0.04	0.09	0.20
Hedge Funds	66,198	0.33	0.35	0.06	0.50	
Others	550,351	0.29	0.34	0.05	0.13	0.37

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

	Amount Adjustment			Post. Amount Adjustment			Neg. Amount Adjustment			Downgrade		
	Refi (1)	Amendment (2)	Adjustment (3)	Adjustment (4)	Post. Adjustment (5)	Neg. Adjustment (6)	Downgrade (7)	Notches (8)	Upgrade (9)	Downgrade (10)	Notches (11)	Upgrade (12)
Lenders owing 50 percent	-0.00579** (0.00239)	-0.0289** (0.0126)	0.0123 (0.00924)	0.0284*** (0.00876)	-0.0161** (0.00792)	0.0378*** (0.0109)	0.101*** (0.0327)	-0.0165 (0.0117)				
Log(Amount)	0.0415** (0.0182)	0.211** (0.0956)	-0.115 (0.0698)	-0.218*** (0.0659)	0.103* (0.0602)	-0.311*** (0.0895)	-0.857*** (0.268)	0.127 (0.0891)				
<i>First Stage</i>												
Downgrade Share	4.44*** (0.87)	4.44*** (0.87)	4.44*** (0.87)	4.44*** (0.87)	4.44*** (0.87)	4.44*** (0.87)	6.51*** (1.55)	4.44*** (0.87)				
Log Loan Size	7.60*** (0.21)	7.60*** (0.21)	7.60*** (0.21)	7.60*** (0.21)	7.60*** (0.21)	7.60*** (0.21)	8.23*** (0.30)	7.60*** (0.21)				
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
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	26.11	26.11	26.11	26.11	26.11	26.11	17.71	26.11				
Observations	29030	29030	29030	29030	29030	29030	13821	29030				