Debt flexibility*

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Abstract

This paper documents new facts on the modification of bank loans using FR Y-14Q regulatory data on C&I loans. We find that loan-level modifications of key contractual terms, such as interest and maturity, occur at least once for 41% of loans. Cross sectional differences in modifications are substantial and amplified by borrower distress. Relative to single-lender loans, syndicated loans are 1.5 times more likely to be modified and interest rate changes are twice as likely. Our findings call into question whether 1) creditor dispersion makes loan modifications more challenging and 2) relationship lending between banks and small borrowers creates more scope for flexibility when borrower-level conditions change.

Keywords: Corporate debt, Loan modification, Covenants, SME lending, Relationship lending.

JEL codes: G21, G32, G33

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1 Introduction

Theories rationalizing debt as an optimal financial contract often emphasize the importance of state-contingent shifts in control and cash-flow rights between lenders and borrowers. State-contingent shifts in control and cash-flow rights are either a way to minimize costs of state verification, or to stop the borrower from diverting funds (Townsend, 1979; Aghion and Bolton, 1992; Hart and Moore, 1994, 1998). Consistent with these theories, evidence from recent empirical work shows that debt contracts are indeed highly state-contingent securities, with payoffs and control rights that adjust in a flexible manner to firm outcomes. This state-contingency can be part of the ex ante contractual design, as empirical work on the prevalence of debt covenants has shown (Smith Jr and Warner, 1979; Chava and Roberts, 2008; Nini, Smith and Sufi, 2009; Chodorow-Reich and Falato, 2022), but it can also result from ex post renegotiation outside the stipulations of the initial credit agreement (Roberts and Sufi, 2009; Roberts, 2015). Most of this evidence comes from the syndicated loan market where groups of lenders, often including both banks and non-banks, provide credit to a single borrower under a common loan agreement.[1]

While important in terms of value, the syndication market is typically restricted to relatively large and mature firms whose capital needs exceed the capacity of any single lender. By contrast, the vast majority of corporate loan contracts involve one bank lending to one borrower, particularly for smaller or less mature borrowers. The literature on relationship lending has long hypothesized that a benefit of such lending arrangements is the flexibility banks can offer borrowers as the financial conditions of the latter evolve (Boot, Greenbaum and Thakor, 1993; Boot and Thakor, 2000; Boot, 2000). This flexibility is, in principle, facilitated by the fact that there is a single creditor in the relationship, thus eliminating free-rider problems that can arise with multiple creditors (Bolton and Scharfstein, 1996).[2] However, there is little direct empirical evidence on whether loans in these relationships are actively modified or renegotiated after origination, as syndicated loans appear to be.

In this paper, we offer a unified perspective on debt flexibility, by documenting how loan modification and renegotiation varies across the entire cross-section of bank borrowers, including those without access to the syndicated market. Our main contribution to the literature is to provide, to our knowledge, the first systematic empirical on flexibility in the context of single-lender loans to small firms. Our key finding is that, in this context, modification and renegotiation are less frequent, and less responsive to change in borrower financial conditions, than in the context of the syndicated loan market.

[1] For an early analysis of the US syndicated loan market, see Dennis and Mullineaux (2000). For more recent evidence on its evolution, see Berg, Saunders and Steffen (2021).

[2] Indeed, Dennis and Mullineaux (2000) argue that syndicated loans have lower relationship intensity, and are generally more "transaction-oriented" than single-lender bank loans.

Our evidence comes from the FR Y14-Q, a regulatory dataset of corporate loan portfolios of large US banks.[3] For our purposes, the FR Y14-Q has two main advantages. First, after the issuance of a loan, the dataset tracks the evolution of its key terms, and records modification events, at a quarterly frequency. Second, the dataset contains both syndicated and single-lender loans, allowing us to compare flexibility across types of lending arrangements directly.

We highlight three main empirical findings. First, consistent with existing evidence for syndications, we find that modification rates are high overall. After origination, 41% of loans experience at least one modification to either the interest rate (or spread, for floating rate loans) or the maturity, while around a quarter of loans experience two or more modifications.

Second, syndicated and single-lender loans exhibit sharp differences in the frequency, type, and timing of loan modifications. Unconditionally, 55% of syndicated loans are modified at least once, and 37% are modified more than once, while the analogous shares are 37% and 20%, respectively, for single-lender loans. In addition, modifications to single-lender loans overwhelmingly consist of maturity extensions. These tend to occur only once, and typically towards the end of the initially contracted maturity period. In contrast, syndicated loans tend to experience interest rate adjustments occurring throughout the life of the loan.

Third, we show that modification rates respond to the onset of financial distress. We measure financial distress in two ways: bank internal rating downgrades, and outright bankruptcy. We find that lenders give financial slack to borrowers after a downgrade. However, the incremental propensity for a bank to modify interest rates after the same change in rating is approximately twice as large for a syndication than for a single-lender loan. Additionally, we find that modification rates are higher overall for firms that eventually enter bankruptcy. However, even for these firms, the majority of adjustments occur outside the bankruptcy period. Overall, loan modifications are by and large not limited to financial distress episodes, and the link between flexibility and distress is tightest among syndications.

We then turn to understanding the economic mechanisms behind these facts. We start by exploring whether state contingency in the original loan agreement underpins modifications. That is, we attempt to distinguish actions reflecting ex-ante contract provisions, from ex-post renegotiation under incomplete contracts. We consider two important forms of ex-ante provisions: covenants and performance pricing. To examine the former, we merge the syndicated loan subsample with information on covenants from the Shared National Credit (SNC) register. To examine the latter, we merge the syndicated loan subsample with information on pricing grids contained in Dealscan. Even though most covenant violations recorded in the merged sample lead to a loan modification, we show that most modifications occur without a covenant violation. Similarly, performance pricing does not appear to account

[3]More information on the FR Y-14Q, along with reporting guidelines and forms, is available at https://www.federalreserve.gov/publications/fr-y-14-qas/y-14-qas.htm.

for the higher rates of modifications among syndicated loans. Overall, the modifications we document for syndications are not all the result of ex ante contractual provisions.

Next, we ask whether the frequent maturity extensions we observe are related to "evergreening", i.e. banks rolling over troubled loans to avoid realizing losses. While loans in distress are indeed more likely to be extended than average, we find that the majority of extensions occur for loans that do not show signs of deterioration. More generally, the prevalence of modifications outside of financial distress suggests that ex-post gains from restructuring distressed debt are likely not the only empirical driver of loan modifications.

A simple but potentially powerful explanation for the fact that single-lender loans are modified far less often than syndications is that ex post modifications involve costs that do not scale with the size of the loan. We show that this explanation has some empirical power, in that there is a clear upward sloping relationship between loan modification rates and loan size, even after controlling for other observable characteristics of the borrower, and for lender and sector fixed effects. Monitoring costs that do not scale with loan commitments provide a potential example of a cost that could account for the size-modification rate relationship. Consistent with this hypothesis, we confirm that internal ratings are more responsive to changes in financial information about borrowers for syndications than for single-lender loans. Furthermore, we proxy the intensity to which loans are monitored by examining the frequency with which information on financials are collected by the lender. The rates are notably higher among syndications throughout the life of the loan, though in the last year of the loan, the gap closes, consistent with our results on the profile of modification hazard rates during the life of the loan. However, we also show that the size-modification rate relationship does not fully account for differences in modification rates between syndications and single-lender loans. Thus factors beyond fixed costs appear to affect the degree of flexibility that banks are willing to provide to their borrowers.[4]

The broader implication of our findings is that flexibility and discretion are *less* frequently exercised in single-lender borrowing situations than in syndications. That is, the syndicated market may be best described as involving a form of relationship lending with continuous flexibility, whereas the single-lender loan market may best be described as involving a form of arm's-length lending with options to extend the loan upon maturity. Thus, in the data we study, the flexibility benefits that single-bank lending relationships have often been hypothesized to generate for small businesses appear to be limited, particularly when compared to those afforded by creditors to borrowers with syndicated loans.

[4]One possibility, to which our evidence cannot directly speak, is that in small business lending, banks in our sample primarily rely on standardized products assigned based on sparse hard information — as they do, with credit scoring, in consumer credit markets (Agarwal, Chomsisengphet and Lim, 2017) —, whereas syndicated lending involves more frequently collected soft information.

Relation to the literature Our paper contributes to three strands of literature.

First, we contribute to the literature on the renegotiation of loan contracts. While there has been extensive theoretical work on factors that facilitate renegotiation and its impacts on ex ante incentives (Berlin and Mester, 1992; Bolton and Scharfstein, 1996; Kiyotaki and Moore, 1997; Diamond and Rajan, 2001; Garleanu and Zwiebel, 2009; Zhong, 2021; Glode and Opp, 2023), empirical evidence is more scarce and restricted to certain types of debt contracts, either bonds (Asquith, Gertner and Scharfstein, 1994) or syndicated loans (Roberts and Sufi, 2009). The paper closest to our work is Roberts (2015), which uses a sample of credit agreements collected from public filings of syndicated lenders to trace out the evolution of contractual terms within individual loans. Relative to this literature, our contribution is to provide systematic evidence on the nature and frequency of loan modifications for a large cross-section of borrowers, not limited simply to participants in the syndicated loan market. Looking beyond the syndicated market is important (Chodorow-Reich and Falato, 2022), as we show that, perhaps contrary to expectations, syndications provide more flexibility to borrowers than single-lender loans. This suggests that creditor dispersion may not necessarily imply a lower likelihood of success when attempting to modify loans. Additionally, we show that modifications need not occur in times of bankruptcy or when bankruptcy concerns are high (though, unsurprisingly, they are more common in such situations), consistent with theories emphasizing outside borrowing options, as opposed to solely bankruptcy outcomes, as key drivers of loan modification.

Second, we contribute to the important and active literature on covenants in debt contracts (Smith Jr and Warner, 1979; Beneish and Press, 1993; Chava and Roberts, 2008; Nini, Smith and Sufi, 2009, 2012; Murfin, 2012; Bradley and Roberts, 2015; Chodorow-Reich and Falato, 2022).[5] This literature has shown that covenant violations are common events and often lead to modifications in contractual terms. Here we make two contributions. First, we show that for syndications, loan modifications outside covenant violations are more frequent than covenant violations themselves, and lead to modifications of comparable magnitude. Thus, for syndications, covenant violations likely provide a lower bound on the extent of adjustment to loan terms. Second, though, we show that these conclusions do not translate to the single-lender market segment. Adjustments in key loan terms are far less frequent in single-lender relationships, which we hypothesize may reflect either less complete ex-ante contractual provisions, or costs of ex-post modification that do not scale with the size of the loan. Our results go through, even when expanding our analysis to allow for performance pricing.

Finally, we contribute to the literature on relationship lending (Leland and Pyle, 1977;

[5] We also connect to the literature on performance pricing (Asquith, Beatty and Weber, 2005; Ivashina, 2005) studies performance pricing grids. Our evidence suggests performance pricing does not account for higher modification rates of syndications.

Diamond, 1984, 1991; Boot, Greenbaum and Thakor, 1993; Berger and Udell, 1995, 1998; Boot and Thakor, 2000; Berger and Udell, 2002, 2006; Bolton et al., 2016; Papoutsi, 2021; Faria-e Castro, Paul and Sánchez, 2021). Our contribution is to challenge the notion that ex post discretion is the key benefit of relationship lending contracts for small businesses, which represent the majority of the observations in our sample. In this respect, the papers closest to ours are Cole, Goldberg and White (2004) and Berger et al. (2005), both of which highlight the organizational difficulties that large banks face in scaling up traditional relationship lending models, potentially resulting in reduced flexibility for borrowers.

2 Data construction

Sources Our main source is the Federal Reserve's FR Y-14Q, which contains detailed quarterly data on the loan portfolios of bank holding companies, savings and loans companies, and intermediate holding companies. Because these data are collected primarily for stress-testing, only institutions with $100 billion or more in total consolidated assets are included. Thus our analysis speaks to lending by large banks.

We use Schedule H.1 which contains facility-level data on corporate loans and leases. The population is limited to loans with a committed balance higher than $1 million as of the reporting quarter.[6] Our basic unit of observation is a loan-quarter. We observe information on committed exposure, interest rate, collateral, maturity date, whether the credit agreement was renewed or restated in the preceding quarter, internal loan rating, as well as summary financial information on the borrower.[7]

We will also use three additional data sources, which we merge with the FR Y-14Q: data on the population of chapter 11 and chapter 7 bankruptcies in the US; data on covenants and covenant violations of syndicated loans from the Shared National Credit (SNC) program; and data on syndicated loans from Reuters LPC's Dealscan. More information on these data sources and our merge are reported in Appendices A.1.2, A.1.3 and A.1.4.

Data sources that have been used to study how loans are modified after origination, particularly in the wake of covenant violations, include Dealscan (Roberts and Sufi, 2009), hand-collected data from SEC filings (Roberts, 2015), and the SNC data (Chodorow-Reich and Falato, 2022). Relative to these sources, the FR Y-14Q has two main advantages for studying loan modifications: it covers a wider swath of the firm population (including non-

[6] Reporting in Schedule H.1 is aggregated at the credit facility level, defined as a credit extension under a particular credit agreement. A credit facility may be drawn or undrawn, it may consist of a term loan or a credit line, it may be secured or unsecured, and so on. When the same facility provides for multiple extensions of credit (for instance, credit lines with different interest rates that may be drawn at different dates), these multiple extensions are aggregated. An obligor may have multiple facilities with the same bank.

[7] More details on variables in Schedule H.1 is in Appendix A.1.1.

syndicated borrowers) and it allow researchers to track loan terms continuously after origination, making it straightforward to observe modifications to key loan terms through the life of the loan. One drawback to the FR Y-14Q is that it only contains information on the basic features of the contract, not on more complex ones like covenants or performance pricing grids. Our merges to the SNC data and to Dealscan are meant to provide information on these arrangements for the subsample of syndicated loans.[8]

Sample selection and loan classification Our loan-quarter level dataset runs from 2012:Q3 to 2022:Q1. We apply a number of selection criteria to the raw data. In particular, we drop any loans to borrowers in the financial and real estate, construction, and utilities sectors; loans carried off-balance sheet by reporting banks; loans for which there is a gap in the sequence between the first and last observations; and loans with missing or difficult to interpret information on key loan terms.[9] The final sample contains 3.3m observations for 337k loans to 136k distinct borrowers. Appendix Table A-2 describes sample selection steps in detail and reports borrower-level summary statistics in the final sample.

In what follows, we will contrast two groups of loans: single-lender (SL) loans, in which a single bank is providing credit to a borrower, and syndicated (SD) loans, in which a group of lenders, often including both banks and non-bank institutions, provide credit to a borrower under a common loan agreement. Schedule H.1 asks banks to report whether the loan is a participation in a syndicated facility, and we use this flag to partition our loans into these two groups.[10] Because different tranches of the same syndicated facility (say, credit line and term loan) may have different contractual terms, we include tranches as separate observations in our sample.[11] We note that our data will generally not contain information on all tranches of a given syndication, since they may be held by institutions not subject to the FR Y-14Q reporting requirement. Appendix A.1.1.3 provides additional details.

Summary statistics Panel A of Table 1 reports summary statistics on the loans in our sample at the time of their origination, for all loans jointly, and for SL and SD loans separately. SL loans make up about 74% of the total number of loans in our sample, though as of 2019:Q4, they only accounted for about two-thirds of total committed exposure by value.

Panel A of Table 1 shows three main differences in contractual terms between SL and

[8] As discussed in Chodorow-Reich and Falato (2022), loans in this subset are accompanied by additional information on covenant compliance and bank responses to any violations.

[9] For instance, a loan for which information on maturity is always missing, or for which the origination date declines across two consecutive reporting periods.

[10] Specifically, we classify a loan as syndicated if the last observation of the FR Y-14Q variable `participationflag` is different from "No, not participated or syndicated". We exclude loans that never exit the syndication pipeline. Appendix A.1.1.3 provides more details.

[11] Our results are robust to including only tranches identified as held by the agent or lead bank.

SD loans. First, SL loans are smaller: the median SL loan has a committed exposure at origination approximately one-ninth of the median SD loan. Second, SL loans are more likely to be secured, though the majority (72%) of SD loans are backed by some collateral. Third, 39% of SL loans are fixed-rate, while only 6% of SD loans are. Third, average maturity at origination is higher for SL loans. Here, the summary statistics reported in Table 1 mask substantial variation. Appendix Figure A-2 shows that the distribution of loan maturity at origination has a large mass at five years for SD loans. In contrast, for SL loans, one-year credit lines are prevalent, as are term loans with maturity beyond five years. We will take this heterogeneity into account by comparing loans of similar maturities at origination.[12]

3 Empirical findings

This section describes our main empirical findings. We start with unconditional facts about loan modifications. We then discuss how modifications relate to borrower financial distress.

3.1 Unconditional facts on loan modifications

Definition We define a loan modification as a change in the loan's reported maturity date, or the loan's interest rate, or both, from reporting quarter $t-1$ to reporting quarter t.

Two things are worth noting about this definition. First, our sample contains both floating-rate and fixed-rate loans. For fixed rate loans, we define an interest rate modification as a change in the overall reported interest rate. For floating rate loans, the interest rate spread is reported explicitly, and we define a change in interest rate as a change in the reported spread.[13] Second, our definition of loan modifications only involves two of the four key loan terms that are observable in the data (interest rate, maturity, collateral, and commitment). This is because changes in commitment or collateral are rare and generally occur alongside changes in either interest rate or maturity, as we document below. Focusing on interest rate or maturity changes helps streamline the discussion.

Our definition of loan modifications is based on changes in loan terms over the life of the loan. However, not all of these changes are necessarily associated with a major amendment to the existing credit agreement. Major amendments to existing credit agreements are flagged by reporting banks: banks will explicitly update the initially reported origination date of the

[12] Appendix Table A-3 reports summary statistics at the borrower level, and compares these summary statistics with their equivalent in Compustat data for the subsample of public borrowers in our dataset. Loans of public borrowers are, on average, more likely to be syndicated, credit lines, floating rate, unsecured, and have more favorable financing terms than loans of non-Compustat borrowers.

[13] In cases where the interest rate on a floating rate loan—the sum of the base plus the spread—is subject to a ceiling or floor, we do not count an adjustment of the spread in order to meet the floor as a modification.

loan in these cases, acknowledging the substantive nature of the change. We refer to these events as re-originations and discuss their relationship to loan modifications in Section 4.1.3.

Modification frequency Our first set of findings, on the frequency of loan modifications, is reported in Panel B of Table 1. This table is constructed using the data collapsed to the loan level and reports the distribution of the number of modifications per loan.

There are two main points to note in Panel B of Table 1. First, unconditionally, 41% of loans experience a modification — a change in either maturity date or interest rate — over the course of their life. The most common pattern is for the loan to be modified only once after origination.[14] Second, SD loans are approximately 1.5 times more likely to be modified than SL loans, at 55% and 37%, respectively. Table 1 also shows that the bulk of the difference is accounted for by loans that undergo several modifications: 26% of SD loans undergo three or more modifications, while only 13% of SL loans do.

Appendix Figure A-1 reports a time-series corresponding to Panel B of Table 1. Here, we use the full loan-quarter sample and compute the fraction of loans undergoing a modification in each reporting quarter. Consistent with Table 1, in any given quarter, the fraction of SD loans undergoing a modification is substantially higher (about 20%, on average) than the fraction of SD loans undergoing a modification (about 10%, on average). These modification rates are stable over our sample period, except for a spike in modification rates in 2020, particularly for SD loans, which was followed by a slight increase since then.[15]

Thus, overall, modifications in key terms after origination is a very common occurrence. Moreover, relative to SL loans, SD loans are more likely to experience modifications – and repeated modifications – over the life of the loan.

Modification type Panel C of Table 1 reports a breakdown of modifications by type. For clarity, we only report the type of the *first* modification over the life of the loan.

The first line in Panel C of Table 1 considers the pooled sample of SL and SD loans. Of the 41% of loans that are modified at least once in the pooled sample, 52% (or 21% of total loans) experience a change in spread, and 55% (or 23% of total loans) experience a change in maturity upon their first modification. Maturity modifications are predominantly extensions. On the contrary, increases and decreases in interest rates are equally likely.

Furthermore, after first modification, only 11% of modified loans also experience a change in committed exposure, and only 5% also experience a change in collateral. Changes in other

[14]Note that given our definition, a loan modification could potentially reflect a simultaneous change in interest rate and maturity; we discuss the composition of modification by type of change in the section below.

[15]We discuss modification during and after COVID in Appendix A.2. While modification rates overall increased during COVID, we show that, consistent with the rest of our analysis in the paper, the increase was more marked for SD loans and generally took the form of interest rate changes. The higher modification rates among that group have persisted since then.

loan terms are, therefore, rare.[16] Finally, simultaneous modifications of both interest rate and maturity are rare, involving only 3% of modification cases. Thus, generally, modifications involve one loan term at a time – either maturity or interest rate.

The rest of Table 1 compares the distribution of the modification types between SL and SD loans. Here a very sharp difference stands out: about three-quarters of modifications of SL loans are maturity extensions, while the number is only one quarter for SD loans. On the contrary, about four-fifths of modifications of SD loans involve interest rate changes, while the number is about one-third for SL loans. Thus, not only the frequency, but also the type of loan modifications differs between the two loan groups.

Table 2 reports results on the frequency and composition of modifications, using data at the loan-quarter level. Specifically, this table reports OLS estimates of the following model:

$$Y_{l,t} = \beta X_l + \Gamma Z_{l,b(l),t} + \alpha_{m(l)} + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \varepsilon_{l,t}. \quad (1)$$

where l indexes the loan, $b(l)$ the borrower, $k(l)$ the bank, and t the quarter, while $m(l)$ refers to the maturity at origination for loan l, and $s(b(l))$ refers to the sector of borrower $b(l)$. $Y_{l,t}$ is either an indicator for whether a modification occurs in quarter t, whether a maturity extension occurs, or whether a change in interest rate occurs. Finally, X_l is an indicator for whether the loan is a syndication or a single-lender loan, while $Z_{l,b(l),t}$ is a vector of controls for loan l and firm $b(l)$ in quarter t, and α refers to fixed effects. Standard errors are reported in parentheses and double-clustered by borrower and quarter.

The first group of columns marked "Modification" reports results from a specification where the dependent variable is a dummy for whether the loan is modified. The first column in that group has no controls or fixed effects. In this specification the mean modification rate is 12.8%, and it is 9.0% higher for SD loans. These magnitudes are consistent with the time-series of modification rates reported in Appendix Figure A-1. The second column is the most saturated specification, which includes lender-by-quarter, sector-by-quarter, and maturity at origination fixed effects, along with loan-level and borrower-level controls.[17] Thus, this specification compares loans to the same borrower in the same sector with similar maturity at origination, and controls for the effects of leverage and profitability. This more saturated specification reduces substantially the sample size. The remaining sample of loans has an unconditional quarterly modification rate of 14.5%, and the incremental modification

[16] Modifications to commitment or collateral are rare overall; when they do they occur, generally coincide with a modification in interest rate or maturity. Only 17% and 20% of modifications to commitments or collateral, respectively, occur without an accompanying change in interest rates or maturity.

[17] We include maturity at origination fixed effects because, as mentioned above, the distribution of maturity at origination differs substantially between SL and SD loans. The groups of maturity at origination we use are based on the initial number of quarters until maturity for each loan. Table 2 reports more details on loan and firm-level controls.

rate for SD loans is 10%. The higher modification rate of SD loans is further confirmed by the third column in this group, where we restrict the sample to borrowers that have at least one SD and one SL loan. We include the same saturation as in the second column, but replace borrower level controls with borrower-by-quarter fixed effects. In this case, the comparison is between two loans issued by the same borrower, one of which is an SD loan and the other is an SL loan, controlling for fixed differences in modification rates between lenders, between borrowers, and between groups of loans with different maturities at origination, as well as for loan characteristics. In that sample, the average modification rate is 17.1%; the incremental modification rate for SD loans is 6.3%, or about one-third higher than average.

The groups of columns marked "Maturity extension" and "Interest rate change" estimate similar specifications, but with different dependent variables: indicators for whether the loan experiences a maturity extension, or whether it experiences a change in interest rate. Consistent with the results mentioned above, maturity extensions are significantly less likely for syndications (-1.4p.p. less, compared to an unconditional rate of 6.7%). By contrast, interest rate modifications are much more likely for syndications (11.4p.p. more, compared to a 9.1% unconditional rate).

Thus, even when comparing SL and SD loans within the same bank, to borrowers with similar characteristics, and with similar maturities at origination, the picture from the simple summary tables above remains: SD and SL loans differ in both the frequency and type of their modifications. SD loan modifications are more frequent and tend to involve interest rate changes, while SL loan modification are less frequent and tend to involve maturity extensions. The tightest comparison possible in the data, between SD and SL loans issued by the same borrower, confirm this result.

Modification timing Finally, Figure 1 speaks to differences in the timing of loan modifications across the two groups of loans. Panel A shows evidence for interest rate modifications, and Panel B for maturity extensions. Each panel contains non-parametric estimates of the hazard rate of each event. We group loans by initial maturity at issuance. The horizontal axis is the time from loan origination to the modification event.

The hazard rate estimates are derived from the Nelson-Aaalen estimator of the cumulative hazard rate (Aalen, 1978; Kalbfleisch and Prentice, 2011), which is given by:

$$\forall t = 6, ..., 35, \quad H(t) = \sum_{q=0}^{t} \frac{M(t-q)}{N(t-q)} - \sum_{q=0}^{t-1} \frac{M(t-1-q)}{N(t-1-q)}. \tag{2}$$

where $M(t)$ is the number of loans experiencing the event (interest rate change, or maturity extension) t quarters after origination, and $N(t)$ is the number of loans that are still in sample t quarters after origination. Intuitively, the estimator in Equation (2) is obtained by summing

the change in the share of active loans that experience the event during each quarter. We plot the first-difference of $H(t)$, which should be interpreted as the (instantaneous) hazard rate of modification of loans in quarter t.[18]

Panels A and B of Figure 1 show that hazard rates of modification (either interest rates or maturity) generally increase as time to maturity declines.[19] If, over the life of the loan, borrower financial conditions change relative to origination, the incentive for either party to seek a loan modification would increase, generating the upward sloping relationship apparent in the data. Additionally, since the hazard rates we document only reflect the first modification, it may be that borrowers whose loans are not modified early on experience greater changes in financial conditions, making a late modification more likely.

Focusing more specifically on Panel A of Figure 1, we observe that interest rate changes are strictly more likely for SD loans than for SL loans at all points in the life of the loan, consistent with the results discussed above. Moreover, the increase in hazard rate over the life of the loan is steeper for SD loans than for SL loans. This suggests that lenders may be more responsive to changes in borrower condition in the context of SD lending relationships than in the context of SL lending relationships, a point we will come back to below, when we discuss the effects of financial distress.

Turning to Panel B of Figure 1, which reports the hazard rate of maturity extensions, two main patterns stand out. First, loans of longer maturity at origination generally have lower hazard rates: the hazard rate of modification of five-year loans is, on average, approximately half that of one-year loans. Second, the hazard rates are broadly similar for SD and SL loans, except toward the end of the life of the loan, where there is a more marked increase in the hazard rate for SL loans.

A joint interpretation of these two facts is that maturity extensions primarily depend on remaining time to maturity, as opposed to the evolution of borrower creditworthiness. If that is the case, short-maturity loans should have higher likelihood of extension, as the data suggest. Additionally, if SL loans are less sensitive to evolving borrower credit conditions, then this horizon effect should be stronger for SL than SD loans. This appears to be the case in the data, particularly for long maturity loans, which show a very rapid increase in extension hazard rate as maturity approaches.

While a loan's hazard rate of modification generally increases over the life of the loan, the results also indicate that the timing of modifications differs between loan types. SD loans experience interest rate modifications throughout their life, whereas SL loans experience sharp increases in the likelihood of maturity extension toward the end of their life.

[18] We report estimates for 1 to 7 years of maturity at origination primarily because our sample covers 10 years of data, so that there is substantial truncation for the majority of loans with maturities higher than 7 years.

[19] The only exception is the hazard rate of maturity extensions for seven-year SD loans, which shows a modest decline in the last two years to maturity.

Summary The results so far can be summarized as follows:

1. Loan modifications are a frequent phenomenon: approximately 40% of all loans originated in our sample are eventually modified, and approximately 15% of all active loans in our sample are modified in any given quarter.

2. SL loans are modified less frequently than average. When they are modified, the modification is overwhelmingly a maturity extension, and, for longer-maturity loans, tends to occur close to the contractual maturity date of the loan.

3. SD loans are modified more frequently than average. The typical modification is an interest rate change, and it can occur throughout the life of the loan.

3.2 Borrower financial distress and modifications

We now study whether loan modification propensities change in response to evolving borrower financial conditions and, if so, whether the tendency differs between SD and SL loans.

Internal loan ratings For each loan, the FR Y-14Q requires banks to report internal risk rating measures. These are computed by banks and are primarily meant to measure distance to default. Banks also report a description of their rating system, which we use to harmonize the ratings into a single scale from 1 to 10 for all banks. Details of this procedure are reported in Appendix A.1.1.4. We define a loan as "distressed" if it experiences a 1 unit or more reduction in rating. On average, in a given quarter, 20% of loans experience a change in rating, and 4.5% experience a 1 unit or more reduction in rating.

Table 3 then reports OLS estimates of the following model:

$$Y_{l,t} = \beta_1 D_{l,t}^{(-)} + \beta_2 \left(D_{l,t}^{(-)} \times X_l \right) + \alpha_l + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \varepsilon_{l,t}. \tag{3}$$

where $D_{l,t}^{(-)}$ is a dummy variable equal to one if and only if the loan experiences a deterioration in internal rating from quarter $t-1$ to quarter t, α_l is a loan-level fixed effect, and the rest of the notation is as in specification (1). In particular, X_l is an indicator for whether the loan is syndicated or not. Note that compared to specification (1), in addition to the interaction with financial distress, the specification contains loan fixed effects. The specification therefore compares modification propensities within the same loan over time, when internal loan ratings for this specific loan change relative to their average for the loan.[20]

[20] A specification that only includes borrower fixed effects documents the change in modification propensity when the loan rating deteriorates relative to the average rating for the borrower across all their loans. Results from this specification are qualitatively identical and quantitatively close to those in Table 3.

There are two results to note in Table 3. First, unconditionally, financial distress is associated with an increase in the likelihood of a loan modification. The effects are substantial: a deterioration in rating is associated with a 5.2p.p. increase in the probability of a modification, relative to a baseline rate of 14.5%. The effects on maturity extension propensities are particularly large; the increase is 4.4p.p. relative to a baseline rate of 6.7%.

The second result is that SD loans are significantly more likely to be modified than SL loans when internal ratings deteriorate. The overall increase in modification propensity following a downgrade is 3.7p.p. higher for SD loans than for SL loans (or about three-quarters of the average effect of 5.2%). Moreover, for SD loans, modifications generally take the form of a change in interest rate: the last column shows that on average, a downgrade increases the propensity to adjust interest rates by 1.7p.p. relative to a baseline rate of 9.1%; for SD loans, this increase in propensity is 6.4p.p., or more than triple the average effect. The difference in incremental propensity to extend maturity is only marginally significant.[21]

Bankruptcy Next, we focus on a more extreme form of financial distress than deterioration of internal loan ratings: bankruptcy. Our data sources on bankruptcy filings and the methodology we follow to merge the bankruptcy data to the FR Y-14Q are described in Appendix A.1.2. Out of the 18,766 borrowers that file for bankruptcy during our sample period and report more than $1 million in book assets at filing, we are able to match 915 with active loans prior to filing in our sample, corresponding to 6,355 loans.

Appendix Table A-4 describes modification patterns for loans of bankrupt borrowers. We note two main findings. First, the top panel shows that, compared to borrowers that do not enter bankruptcy, loans to borrowers that eventually enter bankruptcy are more likely to be modified. However, differences in modification rates are not as stark as might have been expected. SL loans to borrowers that eventually enter bankruptcy exhibit a modification rate 3p.p. higher than in the full sample, while SD loans only exhibit a modification rate higher 1p.p. than in the full sample.[22] Thus, even extreme financial distress does not appear to magnify substantially loan modification rates.

Second, the bottom panel of Table A-4 show that only half of all loan modifications within the bankruptcy sample group occur while bankruptcy proceedings are ongoing. The other half of modifications occurs outside the bankruptcy process (either before or after). Thus

[21] Appendix Table A-1 shows that these results are robust to changes in the measure of financial distress. in particular, the table defines a deterioration in rating in one of two ways: 1) a downgrade in the corresponding S&P rating (e.g., from AA- to A+, or A- to BBB, etc.), or 2) a downgrade in a coarser set of only three categories (investment-grade, non-investment-grade, junk). Quantitatively, the findings are very similar using the downgrade definition based on the 21 S&P rating categories. While the findings remain qualitatively very similar also for the second approach, some estimates are quantitatively different and are less precisely estimated.

[22] The larger, 7p.p. decline in the modification rate overall in the bankruptcy sample, relative to the full sample, is due to the fact that loans are more likely to be syndications in the bankruptcy sample.

even for firms that become financially distressed, modifications appear to occur outside of times of outright distress.

Summary Consistent with the possibility that ex-post gains from restructuring distressed debt account for some of the modifications observed in the data, loan modifications are more likely when borrowers enter financial distress. However, except in bankruptcy, distress is more likely to lead to modifications for SD than for SL loans. The bulk of modifications in distress appear to be aimed at providing short-term relief, both in the form of maturity extensions and interest rate reductions. On the other hand, modifications are by and large not limited to times of outright financial distress, as highlighted in the sample of firms that go through bankruptcy, where even within firm, the majority of modifications occur outside the bankruptcy proceedings.

4 Mechanisms

In this section, we explore the mechanisms driving the facts on loan modification rates documented in Section 3. First, we argue that the bulk of the modifications we observe do not stem from the exercise of ex-ante contractual provisions (such as covenants), but rather from ex-post, ad-hoc changes to contract terms, thus reflecting contractual incompleteness. Second, we provide evidence indicating that the bulk of modifications are not driven by a desire by banks to evergreen under-performing loans. Third, we show that the propensity to modify loans is increasing in loan size, and that modified loans tend to be accompanied by more frequent sharing of financial information between borrowers and lenders.

4.1 Are loan modifications the result of ex-ante contractual provisions?

We provide three pieces of evidence supporting the view that the bulk of the loan modifications observed in our data do not stem from ex-ante contractual provisions being exercised. First, we show that, in the sample of syndicated (SD) loans, while covenant violations are associated with loan modifications, most modifications do not follow from a covenant violation. Second, we show that performance pricing (PP) clauses do not account for the higher rate of interest rate modification observed in the SD loan sample. Third, we study episodes when the initial credit agreement is superseded by a new, revised credit agreement, and show that these revisions are frequent events that lead to large modification in loan terms.

The first two pieces of evidence suggest that our finding of higher modification rates among SD loans relative to SL loans does not appear to be explained by two specific types of contractual provisions (covenants and PP) that have been documented in the literature as

key features of SD loans.[23] Thus other differences between SL and SD loans must explain the gap in modification rates. The third piece of evidence suggests that while ex-ante contractual provisions do lead to modifications, ex-post, ad-hoc modifications are prevalent across both SL and SD loans, indicating pervasive contractual incompleteness.

4.1.1 Covenant violations

Data sources As mentioned in the introduction, a large literature has argued that credit agreements in the syndicated loan market contain a formal mechanism — covenants — that is often used to modify loan terms as borrowers' financial conditions change. Thus a basic question arising from the results of Section 3 is whether the higher rate of modification we observe among SD loans is attributable to their frequent use of covenants.

Our primary data, the FR-Y14Q, does not contain covenant information or details of credit agreements beyond the contractual features studied in Section 3 (interest rate, maturity, collateral, and exposure). To address this issue, we merge the FR Y14-Q to the "covenant review sample" of the Shared National Credit (SNC) database.[24] This is a periodic and random subsample of the SNC database, providing information on whether each loan under review is either currently in violation of a covenant, or whether, at some point in the six months preceding the review, the loan experienced a violation that was since remedied. For each loan-quarter observation in the FR Y14-Q data that we successfully merge to the SNC covenant review sample, we use this information to measure whether a covenant violation has occurred at any point in the last two quarters preceding reporting of loan terms the FR Y14-Q. Appendix A.1.3 reports more details on the merge, the measurement of covenants violations, and summary statistics for the merged subsample.

Relative to the SD loan subsample of the FR Y14-Q, the merged subsample consists of loans that are larger on average, but otherwise have comparable maturities and spreads, and are equally likely to be secured and fixed-rate.[25] Additionally, 57% of all FR Y-14Q loans that appear in the covenant review sample are modified at least once in the FR Y14-Q. This modification rate is comparable to our baseline loan-level modification rate of 55% for SD loans overall in the FR Y14-Q sample.[26]

[23] This interpretation of our findings does not rely on assuming that SL loans feature either covenants or PP clauses. The FR Y14-Q data unfortunately does not feature information on these contractual provisions, a problem we can address by merges to other data sources for SD loans, as described below, but not for SL loans. We are not aware of systematic evidence on the prevalence of these two types of contractual provisions for SL loans.

[24] See Chodorow-Reich and Falato (2022) for a detailed description of these data. Note that these data only cover loan syndications.

[25] The difference in size is due to a higher reporting threshold for committed exposures in the SNC than in the FR Y14-Q. For a more complete description of SNC and its covenant review, and in particular a discussion of composition biases therein, see Chodorow-Reich and Falato (2022).

[26] Appendix Table A-5 reports summary statistics on the merge between the full SNC sample and the FR

Findings Appendix Table A-6 provides detailed information on the relationship between covenant violations and modifications. Panel A, shows that 81% of syndications that ever violate a covenant are modified at some point in the FR Y-14Q. This modification rate is higher than the baseline modification rate of 55% in the overall SD loan sample. Thus, covenant violations appear to be associated with higher modification rates than average. However, Appendix Table A-6 also shows that 63% (=2316/3655) of loans that are modified at some point after origination, and appear in the covenant review sample, are not in violation of a covenant as far as we can observe in the covenant review sample. Thus, while covenant violations are generally associated with modifications, modifications are a broader phenomenon, in that they happen even for syndications that do not violate covenants.

Panel B of Appendix Table A-6 confirms this by looking at the syndication-quarter level data. We classify a syndication-quarter observation included in the covenant review subsample as being in violation if and only if a violation is reported in the 6 months prior to the quarterly reporting date in the FR Y-14Q. Relative to Panel A, Panel B speaks to whether immediately after a violation, loans tend to be modified. We find that is generally the case — 60% of syndications reporting a violation in the review sample are modified in the following six months. The converse is however not true. In the merged sample, the majority (1915/2754=70%) of syndication-quarter observations with modifications do *not* follow in the wake of a covenant violation.

Finally, Appendix Table A-6, panel C, suggests that the magnitude of the modifications outside covenant violations are substantial and in the direction of relief. The average change in interest rate among syndications that never violated a covenant is -14 bps, a loosening of terms. This magnitude should be compared to the *increase* that occur in the current or following two quarters of a covenant violation, and that range from 16 to 54 bps, depending on whether the violation was respectively waived or enforced.

Overall, this evidence suggests that while violations are associated with modifications of loan terms (consistent with the findings of Roberts and Sufi 2009), modifications are a more widespread phenomenon. This has two implications for the main facts documented in Section 3. First, covenants do not appear to account for the differences in modification rates between SD and SL loans, as modification rates among SD loans that do not violate covenants are still larger than modification rates of SL loans. Second, and more broadly, explicit contractual contingencies, as encoded in covenants, are not a pre-requisite for lender and borrower to implement adjustments in key loan terms. To the extent that covenants are regarded as important in influencing loan terms and control, modifications of interest rates outside covenant violations should also be regarded as important.

Y14-Q (top panel), and the SNC covenant review sample and the FR Y14-Q (bottom panel).

4.1.2 Performance pricing grids

Background Performance pricing (PP) refers to the practice of tying the spread on a loan (relative to the base rate) to a performance grid. This performance grid is typically expressed in terms of issuer ratings or financial ratios (debt-to-cash, leverage, interest coverage).[27] Ivashina (2005) shows that in the Dealscan sample, 22.7% of loans contain PP grids, 76.5% of which allow for interest rate decreases in case the performance metrics are achieved. Asquith, Beatty and Weber (2005) study PP in detail, and argue that PP grids are more likely to be implemented in syndications involving banks that have larger re-contracting costs.[28] The prevalence of PP clauses could plausibly contribute to the high frequency of interest rate changes among SD loans, both in absolute terms and, to the extent that PP grids are less common in SL loans, relative to SL loans.

Data sources In order to obtain information on PP clauses, we merge our primary data, the FR Y14-Q, with Dealscan.[29] There are no common identifiers between the FR Y-14 Q and Dealscan, so we use a merge based on borrower name, bank name, and weekly origination date, as described in Appendix A.1.4. For loans that are successfully merged, we create a variable recording whether the corresponding tranche in Dealscan contains a PP clause.[30] This variable is only recorded in Dealscan at the time of origination, so our analysis below assumes that whether a PP grid exists is a fixed loan characteristic.

Findings After the merge to Dealscan, loans in our primary data can be grouped into four mutually exclusive groups: single-lender (SL) loans; syndicated (SD) loans that did not merge to Dealscan; SD loans that did merge to Dealscan, but do not contain PP clauses in Dealscan; SD loans that did merge to Dealscan and contain a PP clause.

Appendix Table A-7 first focuses on modification rates within the latter three categories, which together account for all SD loans in our primary data. Panel A reports modification rates among loans that successfully merged to Dealscan. Among these loans, 50.5% had a PP clause. However, Panel A shows that, somewhat surprisingly loans with PP are significantly *less* likely to experience an interest rate modification (51% vs. 39%). This is true even when

[27] A typical PP grid will specify the spread as a function of a financial ratio. For instance, the spread over LIBOR will be 50bps if the ratio of debt to EBITDA is less than 1, 65bps if it is between 1.00 and 1.75, etc.

[28] See also Adam and Streitz (2016), Ivanov, Santos and Vo (2016) and Kim and Sohn (2017) for examples of the effects of PP grids on loan and borrower outcomes.

[29] Dealscan is a dataset containing information on syndicated loans drawn from a combination of sources, including public filings and regulatory reports, and loan documents and term sheets provided by arrangers and underwriters.See Schwert (2018) for a description of the Dealscan data.

[30] The relevant Dealscan variables are `performance_pricing`, `performance_pricing_grid` and `performance_pricing_remark`. "Loans" in the FR Y-14 Q correspond to tranches of syndications in Dealscan; thus our merge is between FR Y14-Q loans and Dealscan tranches.

one excludes loans that experience distress, which we define as loans that are eventually downgraded from investment grade to junk. Additionally, Panel B of Appendix Table A-7 shows that modification rates among SD loans that did *not* merge to Dealscan do not appear to be materially different from those containing a PP clause. If PP were responsible for the high modification rates of SD loans, one might have expected the modification rate of merged loans without PP grids to be significantly lower than both the non-merged SD sample, and the merged SD sample with PP grids, but our results show the opposite pattern.

The result that loans with PP grids experience lower rates of modification within the merged sample is nevertheless surprising. Appendix Table A-8 suggests that this difference is likely due to selection on unobservable borrower characteristics. In this table, we estimate regressions of the form:

$$Y_l = \alpha_{g(l)} + \beta X_l + \varepsilon_l,$$

where l is a loan, X_l is an indicator for whether a loan contains a PP grid in Dealscan, Y_l is an indicator for whether the loan experiences at least one interest rate modification in the FR Y-14 Q after its origination, and $\alpha_{g(l)}$ is a fixed effect. The regression is run on the sample of successfully merged SD loans. The results of Appendix Table A-8 show that while lender, sector, maturity at origination and origination date fixed effects do not overturn the finding, borrower fixed effects do: within borrowers that have loans both with and without PP grids, the former are more likely to experience an interest rate change. This result is consistent with the possibility that while PP grids facilitate rate modification, selection into which firms have access to PP grids offsets this effect, leading to lower modification rates overall.

Finally, Appendix Table A-9 repeats the baseline analysis of Section 2, splitting syndications into two groups: SD loans that are successfully merged and a PP grid; and merged SD loans without a PP grid. The main specification of interest contains lender by quarter, sector by quarter, borrower by quarter, and maturity at origination fixed effects. The results show that SD loans without PP grids remain significantly more likely to be modified than SL loans. Moreover, the magnitude of the difference in interest rate modification rates are similar when compared to our baseline results reported in Table 2. Overall, this evidence suggests PP grids do not account for the differences in modifications between SD and SL loans, or for the high rates of interest rate modifications among SD loans overall.

4.1.3 Revised credit agreements

We now study direct measures of revisions to credit agreement —– that is, ex-post, ad-hoc changes to the initially agreed upon contract. These measures are available for both SD and SL loan, in contrast to the covenant violation and performance pricing data from the previous section, which are only available for SD loans. We measure revisions to credit agreements

by flagging either re-originations and renewals in the FR Y14-Q, which we define below. We show that these revisions generally lead to modification in key loan terms, and are more frequent for SD loans.

Re-originations A re-origination occurs when a major amendment is made to the original credit agreement and the obligor executes the amended credit agreement. This is reflected in the FR Y-14Q through a change in the origination date of loan. We note that it is explicit in the documentation that a new origination date should not generally be applied simply because of a covenant violation. Appendix A.1.1.5 provides detail on our construction of re-origination dates.

Appendix Table A-10 reports summary statistics. Three findings are worth highlighting. First, re-originations are not rare: they occur at least once for 8% of all loans. Second, 70% of re-originations coincide with a loan modification in the current or prior quarter, so they lead to the modifications we documented in Section 3. Third, during a re-origination, the change in key contractual terms that is most commonly observed is an increase in loan maturity. Changes in interest rates or reductions in maturity are observed in only about 10% of all re-originations. In the case of interest rate changes, we see that about half are in the direction of relief. Thus while re-originations are associated with loan modifications, they are more frequently followed by maturity extensions than the typical modification documented in Section 3.[31]

Next, we ask whether this form of revision to credit agreements is more common for SD loans. Appendix Table A-11 reports results from specifications similar to (1). The most saturated specification (the third column) includes borrower by quarter fixed effects, and thus compares firms with multiple loans outstanding. In this case, syndicated loans exhibit a propensity to be re-originated that is 0.4 p.p. higher than the average 1.2% likelihood of re-origination. Thus, re-origination is significantly *more* likely for SD loans than for SL loans, consistent with our main findings of higher flexibility for SD loans.

Renewals A renewal refers to cases where the original maturity, the original interest rate, or some other core loan provision is changed without a change in the contractual date of the original loan, as is the case for re-originations. Renewals are tracked separately from re-originations in the FR Y-14Q. Unfortunately, FR Y-14Q reporting guidelines are unclear about whether banks should treat *only* modifications that result from existing contractual contingencies being triggered as renewals, or also include ad hoc ex post modifications that

[31] Re-originations are also somewhat more likely for firms that face financial distress; untabulated results show that after controlling for lender-by-time, sector-by-time, and maturity at origination fixed effects, the likelihood of re-origination is 0.9p.p. higher for a loan facing financial distress, as defined in Section 3.2, relative to a baseline re-origination likelihood of 1.3%.

are sufficiently small in scope that they do not require a new credit agreement to be executed.[32] Since it is therefore possible that renewals reflect pre-determined clauses of the initial credit arrangements, we therefore tabulate them separately from re-originations.

Appendix Tables A-10 shows that renewals, like re-originations, should be thought of as a rough subset of modifications, as 60% of all renewals involve a modification and the quarterly frequency of renewal in our sample is approximately 4%. The most common form of observable loan modification at renewal is a maturity extension, which occurs for about half of all renewed loans. Although Appendix Table A-10 shows that SL are more likely to be renewed than SD loans, this finding is driven by a composition effect. Relative to SD loans, SL loans have a higher share of one-year credit lines (as indicated in Appendix Figure A-2), and these credit lines often tend to be renewed at maturity, thereby increasing overall renewal rates of SL loans. To overcome these composition effects, we compare loans of similar maturity at origination. Consistent with re-originations and modifications, we find that renewals are indeed significantly more likely for SD loans than for SL loans. These results are reported in Table A-11, which estimates a specification similar to (1), including maturity at origination fixed effects. The results indicate that relative to a mean rate of renewal of 3.1%, renewals are 0.8p.p. more likely among SD loans.

Summary This evidence shows that ex-post revisions of credit agreements are common events; that they generally involve maturity extensions; and that they are more likely for SD than for SL loans. These patterns, which are qualitatively consistent with those documented in Section 3, further support the view that the modifications we documented in that section are not all driven by ex-ante contractual provisions. Instead, these modifications are likely to be the outcome of renegotiations between borrower and lender against the backdrop of an incomplete credit agreement.

4.2 Are loan modifications driven by evergreening motives?

Section 3 shows that loan modifications often take the form of maturity extensions, particularly for SL loans. Additionally, these extensions disproportionately occur toward the end of the life of the loan and are the most common form of loan modification in the context of a renegotiation (as defined in Section 4.1.3). This tendency for banks to grant maturity extensions to small borrowers close to maturity brings to mind the notion of "evergreening". We use the term to refer to situations where lenders provide short-term relief to borrowers

[32]Specifically, FR Y-14Q reporting instructions only indicate that extension options at the discretion of the borrower, changes in maturity dates, re-pricing, periodic credit reviews, waivers, or covenant modifications, should not be considered as a re-origination of the loan agreement, but only as a renewal. They do not explicitly indicate whether renewals should only be recorded when a contractual contingency is exercised or triggered.

that are close to default, in the hope that this relief will spare the lender having to recognize loan losses (Faria-e Castro, Paul and Sánchez, 2021). Maturity extensions could be one of the mechanisms through which this relief is provided to near-insolvent borrowers.

We cannot rule out the fact that ad hoc maturity extensions are one of the tools through which evergreening occurs. In fact, the results of Section 3.2 suggest that financial distress increases the likelihood of a maturity extension, even if they are silent on whether these extensions are "efficient". However, loan modifications appear to be a broader phenomenon than evergreening. Appendix Table A-12 shows that the typical loan modification is *not* granted in times of financial distress. Specifically, the table reports the fraction of modifications happening outside and during financial distress (defined as a three quarter window around an internal downgrading of the loan). Even for SL loans, over 90% of all modifications and over 90% of maturity extensions occur outside financial distress. Thus, by and large, loan modifications occur outside financial distress, suggesting that other motives than evergreening are at play in the decisions to adjust loan terms.

4.3 Are higher modification rates related to loan size?

The results discussed in Section 3 contrast the frequency of loan modifications and renegotiations for two groups of loans – syndications (SD) and single-lender (SL) loans. This is motivated by a literature, mentioned in the introduction, arguing that debt held by more diffuse groups of creditors is less likely to be successfully modified or renegotiated in times of borrower financial distress (Bolton and Scharfstein, 1996; Becker and Ivashina, 2014). In contrast, we provide evidence that SD loans are *more* likely to be modified than SL loans, particularly in financial distress, despite creditor pools in syndications being, by definition, more dispersed than in single-lender relationships.

A natural question about this result is whether the distinction between SD and SL loans simply reflects loan size, as opposed to credit concentration. Indeed, Table 1 shows that the median committed exposure of the average SD loan in our sample is approximately 9 times larger than that of the average SL loan. Costs associated with modifying loans, to the extent they do not scale with size, could thus account for our results.

Figure 2 reports a binned scatterplot of modification rates. The horizontal axis corresponds to deciles of the distribution of loans by committed exposure, and the vertical axis is the average modification rate in each decile. The modification rates reported are net of lender-time, sector-time, borrower fixed effects, and maturity-at-origination fixed effects.[33]

Figure 2 shows two main findings. First, within each group of loans (SD and SL loans),

[33]Specifically, we first residualize modification and renegotiation rates by estimating the OLS regression $Y_{l,t} = \alpha_{m(l)} + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \alpha_{b(l)} + \varepsilon_{l,t}$, where the notation is as in specification (1), and construct Figure 2 using $\varepsilon_{l,t}$ for each $Y_{l,t}$.

there is a clear positive relationship between size and modification rates, a pattern which would be consistent with the hypothesis of there being fixed costs associated with loan modifications. Second, though, the figure shows size does *not* entirely account for the difference in modification rates across the two loan groups as modification rates remain approximately 1.5× larger for SD than for SL loans, even for loans of comparable size.[34] Thus, while the relationship between modification rates and size is consistent with loan modifications involving costs that do not scale with size, the interaction of (identical) fixed costs with differences in loan size cannot alone account for our finding of higher modification rates for SD loans.

What kinds of fixed costs could account for the size-modification rate relationship observed in Figure 2? One hypothesis is that modifying loans requires the frequent and repeated sharing of information between the borrower and its lender or syndicate of lenders, as part of the ongoing process of monitoring of the value of the lender's claim. If the costs of creating information-sharing mechanisms (standardizing the collection of financial information about the borrower, auditing the borrower's accounting processes), or the costs of each reporting of financial information, do not scale with loan commitment, then these costs could underpin the size-modification rate relationship.

To proxy for the frequency of financial information sharing, we use the dates for which borrower financials are reported and/or audited. Specifically, the Y14 features a variable containing the date as of which the financials (reported by the Y14 banks about the borrower) were current. In addition, the banks also may report the date of the borrower's last audited financial statements. We will refer to these as "financials date" and "last audit date".

Appendix Table A-14 reports the results. Panel A shows that about 91% (= 24.5%/(2.4% + 24.5%)) of SD loans have at least one update of their financials during the life of the loan, while only about 81% of SL do. Likewise, 80% of SD loans are to borrowers that are audited at least once during the life of the loan, while only about 42% SL loans are to borrowers undergoing an audit while in sample, suggesting that more information is gathered on the borrowers with SD loans.[35] Panel B of Appendix Table A-14 focuses on *rates* of financial information sharing. We first calculate, for loan i and event $x \in \{$audit in last quarter, financials update since last

$$\rho_{x,i} \equiv \frac{\text{\#occurence of } x \text{ in loan } i}{\text{\#observations for loan i}}$$

Computed this way, the quarterly rate of audit is 26% for SD loans, while it is only 11% for

[34] Appendix Figure A-4 reports the distribution of commitments at origination for the two types of loans.

[35] Almost all loans merged with Dealscan have values present for financials date and last audit (these, of course, are all SD loans). There does appear to be a somewhat higher rate among those with performance pricing. It is unclear if the differences are statistically significant. Ratios of loans with financial date to loans without are 7.93 and 10.1 for loans without and with PP, respectively. Ratios of loans with last audit date to loans without are 27.1 and 57.3 for loans without and with PP. Thus broadly, loans featuring PP clauses appear to involve more frequent sharing of information between lenders and borrowers

SL loans. The rates are 30% and 44%, respectively, for updates of financials. Thus overall, monitoring intensity seems to be higher among SD loans than SL loans, consistent with the ideas that modifications require monitoring, the cost of which does not scale with loan commitment.[36]

We conclude by noting that the finding of higher modification rates for SD loans does not necessarily contradict the idea that creditor dispersion hinders loan modifications. In fact, our data show some support for this mechanism. Appendix Table A-13 shows that new loans to firms with loans outstanding to more banks are, all else equal, less likely to be modified, consistent with the traditional mechanisms highlighting free-rider problems with large groups of creditors. Our statements on the relationship between size and modification rates are simply highlighting that creditor dispersion is unlikely to give a full empirical account of factors driving modification rates in bank lending relationships.

5 Conclusion

In this paper, we use regulatory filings on corporate loan portfolios of large banks to document the frequency, nature, and timing of modifications to corporate loans. In doing so, we have highlighted three main findings. First, modifications are very frequent events; about 40% of all loans issued are modified before their initial contractual maturity. This magnitude is even higher than the propensity to violate covenants documented in the literature on syndicated lending. Second, the frequency, nature, and timing of loan modifications differs substantially between single-lender and syndicated loans: while single-lender loans tend to be modified once, typically through a maturity extension toward the end of the life of the loan, syndicated loans are often modified multiple times, typically with a change in the interest rate spread of the loan. Third, we show that modification rates are sensitive to the onset of borrower financial distress, though syndicated loans are substantially more responsive than single-lender loans.

These results are useful for at least three reasons. First, they confirm and extend the evidence from syndicated loans and covenants suggesting that corporate debt contracts have a high degree of flexibility and state-contingency, consistent with theoretical predictions of models based on contractual incompleteness. Second, the contrast between modification rates of single-lender and syndicated loans suggests that creditor concentration may not always guarantee a higher success of ex-post loan modifications which is contrary to predic-

[36] Interestingly, the differences in monitoring intensities are dampened or even reversed when the loan enters its last year. That is, Panel B shows that SL loans typically feature more financial updates in their last year than SD loans. This suggests that each instance of financial information sharing requires a fixed cost that lenders are only willing to undergo late in the life of the loan, when it needs to be rolled over, consistent with our results on the timing of loan modifications for SL loans.

tions of models in which creditor coordination hinders ex-post contractual re-arrangements like restructurings. Third, our findings challenge the traditional view that relationship lending between a single bank and its borrower generate benefits for both by creating space for ex-post discretion. At least in the context of relationships between large banks and small borrowers covered by our dataset, lender relationships appear to be more arm's length than they are in the syndicated market. Outside the extreme distress of bankruptcy filings, modification rates of single-lender loans are substantially less responsive to changes in borrower-level financial conditions than their syndicated counterparts.

There are at least two questions that our analysis leaves open. First, we do not provide a mechanism for why single-lender relationships may be less flexible than syndicated relationships. The relationship literature has hypothesized that difficulties in scaling the relationship lending model, which does not lend itself to automation, may be partly responsible for this (Cole, Goldberg and White, 2004; Berger et al., 2005). Variation across banks in modification rates in our data may be useful to test for this hypothesis. Second, we do not explore the real economic consequences of debt flexibility, though related literature on covenants has shown that covenant violations or changes in covenant tightness can be associated with changes in revenue growth or investment rates (Nini, Smith and Sufi, 2009; Chodorow-Reich and Falato, 2022). Though more limited in scope than existing datasets on public firms, the FR Y-14Q can, in principle, be used to trace out financial and real outcomes after modifications. Both of these questions matter for tackling a broad issue: are large banks providing too little flexibility to their SME borrowers? That is, would the costs of closer relationship lending by large banks be smaller the benefits that ex-post discretion might create? We hope to tackle this question in future research.

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	All loans	Single-lender (SL) loans	Syndicated (SD) loans		
			All	Agent	Non-agent
Panel A: Summary statistics at origination					
# Loans	337k	248k	89k	16k	72k
# Borrowers	133k	125k	14k	7k	12k
Committed exposure ($mn)					
mean	15.8	7.6	38.9	51.1	36.1
median	3.3	2.3	18.0	23.0	17.0
Spread (bps)					
mean	171	165	186	207	182
median	175	175	175	200	162
Maturity (yrs)					
mean	5.2	5.4	4.5	4.9	4.4
median	5.0	5.0	5.0	5.0	5.0
% Fixed-rate	30%	39%	6%	8%	6%
% Secured	84%	88%	72%	74%	72%
% Public	17%	8%	45%		
Panel B: Modification frequencies					
% 0 modifications	59%	63%	45%	41%	46%
% 1+ modifications	41%	37%	55%	59%	54%
% 1 modification	17%	16%	18%	18%	18%
% 2 modifications	8%	7%	11%	11%	11%
% 3 modifications	5%	4%	8%	8%	7%
% 4+ modifications	11%	9%	18%	23%	17%
Panel C: Modification types					
% 1+ loan term modified	41%	37%	55%	59%	54%
Modification to:					
Spread	52%	37%	80%	80%	81%
Maturity	55%	72%	24%	25%	24%
Committed exposure	11%	11%	9%	9%	10%
Collateral	5%	4%	5%	5%	5%

Table 1: Summary statistics at origination (Panel A), modification frequencies (Panel B), and modification types (Panel C). The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. In Panel A, all loan terms are measured as of the first origination date of the loan. "Committed exposure" is the amount borrowed. "Spread" is the interest rate spread, expressed in basis points. If the loan is floating rate, we use the spread reported by the lender; if the loan is fixed rate we use the spread of the contractual interest rate over 3-month LIBOR or the Treasury yield that matches the remaining maturity of the loan. Maturity is the difference, expressed in years, between the origination date reported the first time the loan is observed, and the maturity date reported the first time the loan is observed. "Fixed rate" indicates whether the loan is fixed or floating rate. "Secured" indicates whether the loan is secured by a specific asset or group of assets. The columns "Agent" and "Non-agent" focus on loan tranches held by the syndicate's agent, and those held by other banks. In Panel B, a modification is defined as change in the interest rate (for fixed rate loans) or interest rate spread (for floating rate loans), or a change in maturity date, from the preceding quarter to the following quarter. Modifications are counted from the first time a loan is observed in sample to the time of its disposal. In Panel C, we consider only the distribution of modification types for the first time that the loan is modified. See Section 2 and Appendix A.1 for more details on the definition of variables in terms of underlying data items, on sample selection, and on the classification of loans between single-lender and syndicated. The columns in the bottom of panel C can to values greater than 100 percent because modifications can occur simultaneously, i.e. an interest rate change and spread change occur in the same quarter.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$			$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$			$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_l$	9.8	9.3	6.1	−3.6	−1.8	−2.0	13.4	11.1	8.1
	(0.23)	(0.29)	(0.37)	(0.10)	(0.14)	(0.22)	(0.23)	(0.26)	(0.33)
mean rate	13.1%	14.6%	17.1%	6.5%	7.2%	4.9%	7.5%	9.1%	13.7%
lender × quarter f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
sector × quarter f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
borrower × quarter f.e.	✗	✗	✓	✗	✗	✓	✗	✗	✓
maturity at orig. f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
loan controls	✗	✓	✓	✗	✓	✓	✗	✓	✓
borrower controls	✗	✓	✗	✗	✓	✗	✗	✓	✗
bor. with SL & SD loans	✗	✗	✓	✗	✗	✓	✗	✗	✓
# obs	3951k	1456k	799k	3210k	2130k	792k	3210k	2130k	792k
# loans	392k	197k	96k	337k	250k	95k	337k	250k	95k
# borrowers	156k	71k	6k	137k	84k	6k	337k	84k	6k

Table 2: Syndication status and loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 29 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (1). The line "mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first three columns, a modification is defined as either a maturity extension, or a modification of interest rates. For each of the three outcome variables, we consider a specification with no independent variables other than syndication status, a saturated specification, and one restricted to firms that have at least one single-lender and one syndicated loan. In the saturated specification, the loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; and indicator for whether the loan is fixed-rate; and the ratio of committed exposure to total assets of the borrower. The borrower-level controls are: the ratio of current assets to total assets; the ratio of net income to total assets; the ratio of book debt to total assets; and an indicator for whether the borrower is a publicly traded firm. In the third specification, which is restricted to firms that have at least one single-lender and one syndicated loan, we include the same loan-level controls as in the saturated specification. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$		$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$		$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$	
$D_{l,t}^{(-)}$	5.2	1.6	4.4	1.1	1.7	0.9
	(0.29)	(0.57)	(0.24)	(0.38)	(0.18)	(0.53)
$D_{l,t}^{(-)} \times \mathbf{1}\{\text{Syndication}\}_l$	3.7	2.6	−2.9	0.74	6.4	2.3
	(0.54)	(0.68)	(0.32)	(0.41)	(0.52)	(0.64)
mean rate	14.5%	16.8%	6.7%	4.7%	9.1%	13.3%
lender × quarter f.e.	✓	✓	✓	✓	✓	✓
sector × quarter f.e.	✓	✓	✓	✓	✓	✓
borrower × quarter f.e.	✗	✓	✗	✓	✗	✓
maturity at orig. f.e.	✓	✓	✓	✓	✓	✓
loan f.e.	✓	✓	✓	✓	✓	✓
borrower controls	✓	✗	✓	✗	✓	✗
borrowers w/ SL & SD loans	✗	✓	✗	✓	✗	✓
# obs	2159k	848k	2159k	848k	2159k	848k
# loans	250k	98k	250k	98k	250k	98k
# borrowers	84k	6k	84k	6k	84k	6k

Table 3: Financial distress and loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (3). The variable $D_{l,t}^{(-)}$ is a indicator that is equal to 1 if the loan rating of the loan declines by at least 1 on a scale of 1 to 10 between quarters $t-1$ and t (ratings can change by more than 1). The line "mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first two columns, a modification is defined as either a maturity extension, or a change in interest rates. For each of the three outcome variables, we consider specifications with 1) borrower controls and 2) borrower-by-quarter fixed effects on the sample restricted to firms that have at least one single-lender and one syndicated loan. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

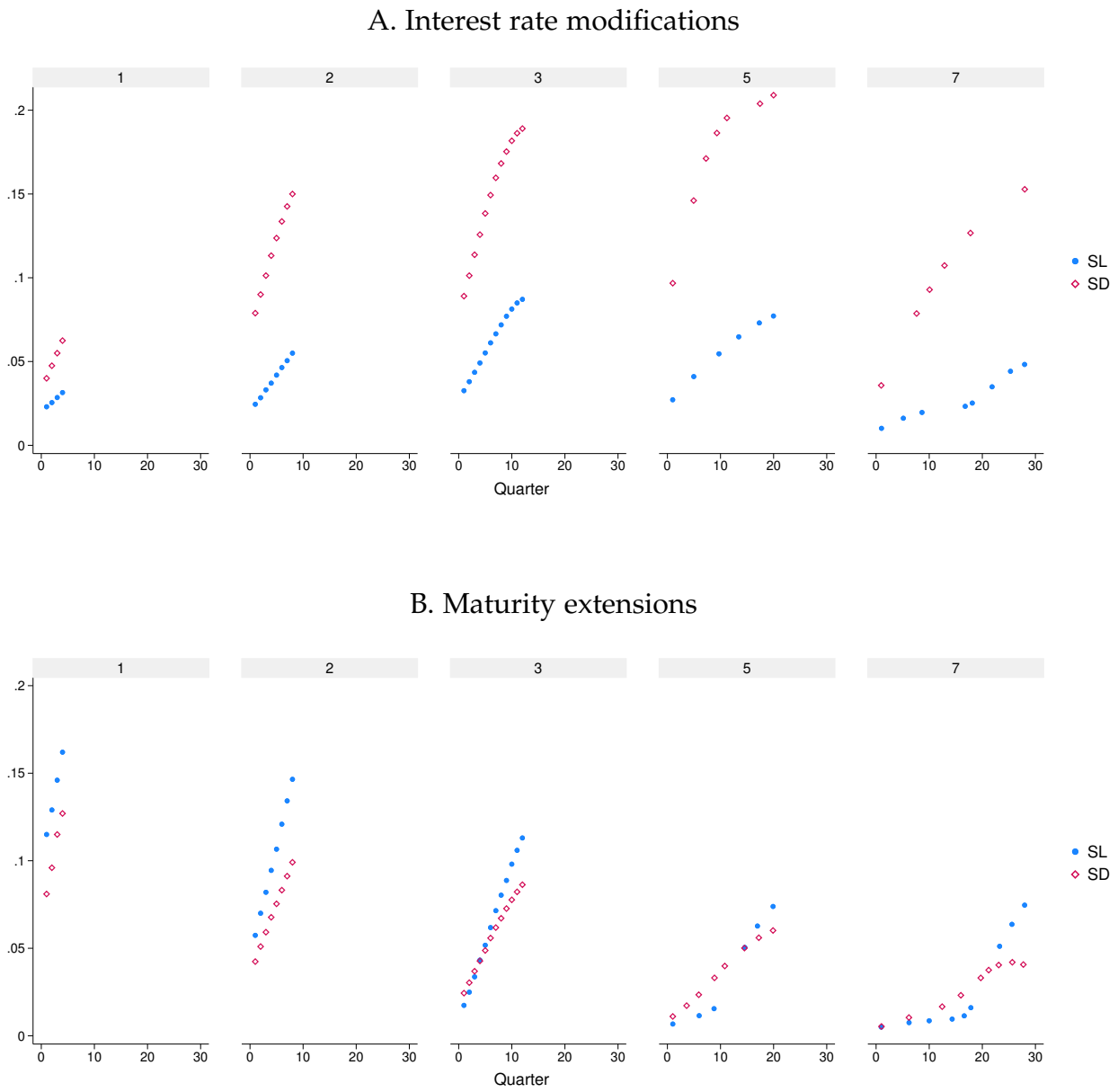


Figure 1: The timing of loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. Panel A shows interest rate changes, and Panel B shows maturity extensions. Each subpanel focuses on loans with different maturities at origination, with the number of years at origination indicated in the title of the subpanel. In each subpanel, the horizontal axis is the number of quarters after the origination of the loan. On the vertical axis, we report an estimate of the hazard rate of each event (interest rate change or maturity extension) using the Nelson-Aalen estimator of the hazard function. The red diamonds correspond to syndicated (SD) loans and the blue dots correspond to single-lender (SL) loans. See Appendix Figure A-3 for the timing as a fraction of loan maturity.

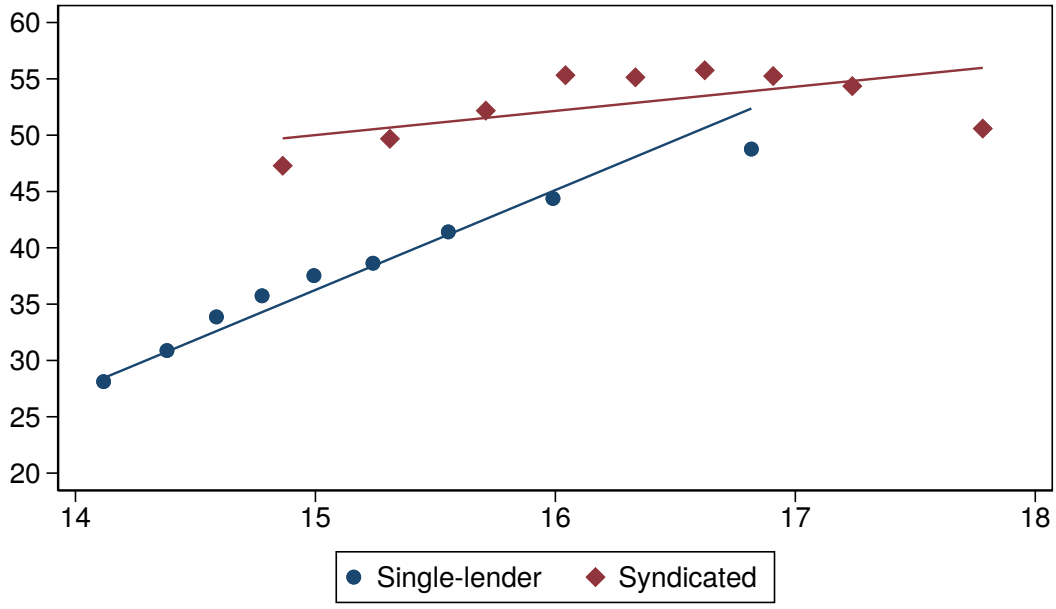


Figure 2: Modification rates and loan size. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 29 banks in the sample. Loan modifications are defined as in Section 3. The horizontal axis is loan size, expressed in millions of $, and the vertical axis is the fraction of loans modified or renegotiated at least once after issuance within that size bin. Size is defined as the committed exposure at the time of first origination of the loan. Scatterplots reported in red diamonds correspond to syndicated loans, while scatterplots reported in blue circles correspond to single-lender loans. The data are residualized with respect to sector-time, lender-time, and maturity at origination fixed effects before constructing the binned scatterplots. The corresponding underlying size distribution of commitments is reported in Appendix Figure A-4.

Internet Appendix for "Debt Flexibility"

A.1 Details on data construction

A.1.1 The FR Y14-Q schedule H.1

This appendix provides more details on our treatment of the Schedule H.1 data. The data have a loan-by-quarter panel structure.

A.1.1.1 Variable definitions and sample selection

The variables we use rely on (a) underlying fields corresponding to the variables defined in the FR Y-14Q reporting instructions; and (b) identifiers which we define and construct ourselves.[37] The following listing contains a description of these variables.

Variable	Field	Description and Cleaning Steps
`date_q`	N/A	quarterly reporting date
`loanID`	3	fill forward `OriginalInternalObligorID`
`borrowerID`	4, 9, 13, 14	1. drop loans missing `obligorname`, `tin`, `tickersymbol`, and `cusip` 2. fill in missing `tin` when `obligorname` matches 3. create borrower id for each `obligorname` or `tin`
`IndustryCode`	8	NAICS, SIC, or GICS code reported to 4 to 6 digits
`committed_flag`	24	Loans where `committedexposure` increases by more than 10 percent are flagged.
`variability`	37	1. Because loans can be reported as "fully undrawn", fill forward from the previous `variability` 2. Then backfill if "fully undrawn" A change in variability is flagged as positive when a loan goes from fixed (1) to either floating (2), mixed (3), or fee-based (4) and vice versa for negative. These changes are rare and only occur for about 5% of loans.
`interestrate`	38	For fixed rate loans, as indicated by the cleaned `variability` variable 1. Fill forward with the previous `interestrate` if its 0 or missing because the loan is fully undrawn as indicated by field 37 2. Back fill with the next `interestrate` if its 0 or missing because the loan is fully undrawn as indicated by field 37 A change in `interestrate` greater than 5 bps is flagged if the loan has exited the syndication pipeline. Our results are robust to using a threshold of 10 or 15 bps.
`interestratespread`	40	For non-fixed rate loans, as indicated by the cleaned `variability` variable 1. Fill forward with the previous `interestratespread` if its 0 or missing because the loan is fully undrawn as indicated by field 37 2. Fill backward with the previous `interestratespread` if its 0 or missing because the loan is fully undrawn as indicated by field 37 3. For fixed rate loans out of the syndicated loan pipeline, set `interestratespread` as the `interestrate` less the Treasury yield that matches the remaining maturity of loan if the remaining maturity is greater than one year. Otherwise, use `interestrate` less prime if the remaining maturity of the loan is less than one year A change in `interestratespread` greater than 5 bps is flagged if the loan has exited the syndication pipeline. Results are robust to a threshold of 10 or 15 bps.

[37] See pages 169 to 221 of https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=5bc5f538-ec2f-41ed-9b4c-b6265c0a428c.

interestrate_flag		The composite of either a flagged change in interestrate for fixed rate loans or interestratespread for all other loans including floating rate loans
maturitydate	19	1. If maturitydate is missing, fill forward as long it is greater than date_q, i.e. the loan did not mature in the previous period 2. Backfill maturity date if it's missing and greater than or equal date_q A change in maturitydate is flagged when loans have exited the syndication pipeline.
modification_flag		The maximum of flagged changes in maturitydate and interestrate_flag
securitytype	36	A change in securitytype is flagged after 2012:Q2 and is a positive change if it goes from unsecured (6) to secured (0,1,2,3,4,5) and vice versa for negative.
renewaldate	91	1. If renewaldate== maturitydate and renewaldate>date_q, replace renewaldate with date_q and fill forward 2. If originationdate==renewaldate, set renewaldate to originationdate in the quarter prior to the accidental change in originationdate 3. Fill forward renewaldate if missing 4. Replace with max of renewaldate and originationdate if originationdate is backwards moving 5. Fill forward renewaldate again if missing 6. Fill backward renewaldate again if missing 7. If renewaldate> date_q and prior observations are missing, set to date_q 8. If a change in renewaldate is recorded one quarter after it occurs, set it to the quarter when it occurs A change in renewaldate for loans not in the syndicated pipeline is flagged when the updated renewaldate is within one quarter of date_q. Because of the quarterly frequency, we only flag changes in renewaldate that occur more than 92 days apart.
originationdate	18	1. backfill originationdate if it is blank or is backwards moving. It can be backwards moving if renewaldate==originationdate 2. If originationdate> date_q and prior observations are missing, set equal to the previous originationdate 3. If a re-origination is recorded one quarter after it occurs, set it to the quarter when it occurs A change in originationdate is flagged under the same criteria as renewaldate described above
renegotiation_flag		Because the definition of originationdate is changed and renewaldate is introduced in 2014:Q4 as explained in section **??**, it is useful to take the maximum of the two dates and use this as composite flag.
date_of_financials	52	See section A.1.1.2.
total_assets	70	See section A.1.1.2.
net_income	59	See section A.1.1.2.

Appendix Table A-2 describes the sample selection steps we apply to arrive at our analysis sample, along with the number of observations remaining at each step.

A.1.1.2 Firm level financial and loan/borrower level controls

Our regression specifications use various borrower and loan level controls as well as several borrower-level financial variables from the FR Y-14Q. The financial variables listed in Appendix A.1.1.1 are available at the loan level at the quarterly frequency. However, each quarterly observation does not necessarily reflect up-to-date financial information. Instead, the variable date_of_financials, reports the date the financial information was updated last. In practice, financial data is updated somewhat irregularly, but typically new data are

available at least annually for each loan. Using our constructed borrower identifier we take the median value of the financial variable at hand across all available observations for a given borrower at a given date (for the financials). We additionally define:

- Number of banking relationships: number of banks with whom a given borrower currently has outstanding loans.
- Bond access: ==1 if a borrower currently has a CUSIP identifier at any date; = 0 otherwise.
- Age of banking relationship: number of years since the borrower had their first loan outstanding with the bank.
- Number of loans in relationship: number of currently outstanding loans between the bank and the borrower.

A.1.1.3 Syndication status

We use the variable `participationflag` to classify loans between syndicated and single-lender loans. Because other variables related to syndication—such as `sncinternalcredit`, `participationinterest`, and `syndicatedloanflag`—are not available for the full sample, we do not use these to define syndicated loans. Instructions to reporting banks regarding `participationflag` changed in 2016:Q2:

- Before 2016:Q2, reporting instructions are:[38] *Indicate if the credit facility is participated or syndicated among other financial institutions.*
  1. *No*
  2. *Yes, purchased by reporting BHC [bank holding company]*
  3. *Yes, sold by reporting BHC [bank holding company]*
- After 2016:Q2, reporting instructions are:[39] *Indicate if the credit facility is participated or syndicated among other financial institutions and if it is part of the Shared National Credit Program. For fronting exposures report option 1, "No".*
  1. *No*
  2. *Yes, syndicate/participant in syndication but does not meet the definition of a Shared National Credit*
  3. *Yes, agent in syndication or participation but does not meet the definition of a Shared National Credit*
  4. *Yes, syndicate/participant in Shared National Credit*
  5. *Yes, agent in Shared National Credit*

[38] See https://www.federalreserve.gov/reportforms/forms/FR_Y-14Q20140331_i.pdf, p.183, field 34.
[39] See https://www.federalreserve.gov/reportforms/forms/FR_Y-14Q20160930_i.pdf, p.202, field 34.

We define syndicated loans as those where the last observation `participationflag` $\neq 1$, and single-lender loans as the remainder. Additionally, we exclude loans that never exit the syndication pipeline. Finally, after 2016:Q2, we use the additional information reported in the variable `participationflag` to determine whether the reporting bank is acting as the agent in the syndication to which the loan tranche belongs.

A.1.1.4 Internal loan ratings

Banks are required to submit their `internalrating` for each obligor. As there is no standardized rating across banks, staff of the Federal Reserve System has internally standardized the ratings on a scale from 1-10, with 1 being the lowest and 10 being the highest rating. These rating are then further mapped to various agency ratings such as S&P. Table 3 showed how financial distress, as measured by a deterioration in the internal loan rating, is correlated with the likelihood of various loan modifications.

A.1.1.5 Re-originations and renewals

We now discuss two additional ways of measuring changes in loan contracts in the FR Y-14Q: re-originations and renewals. These are used in Section 4.1.3. The definition of the `originationdate` variable used to define re-originations is changed three times in our sample: in 2014:Q1, 2015:Q1, and 2016:Q1. Moreover, in 2016:Q1 the `originationdate` variable is split into the `renewaldate` variable. 2012:Q2 is the first available instructions form. The following listing clarifies the changes in variable definitions.

	originationdate			renewaldate
	2011:Q3-2013:Q3	2013:Q4-2014:Q3	2014:Q4-present	2014:Q4-present
Legally binding agreement	✓			
Legally binding commitment		✓	✓	
Renewal	✓			✓
All credit actions that require bank approval	✓			
Change in contractual date of obligation	✓	✓		
New or amended and restated credit agreement			✓	
1. Extension options				
2. Covenants	✓			
3. Waivers	✓			
4. Change in maturity date	✓	✓		✓
5. Repricing	✓	✓		✓
6. Periodic credit reviews	✓	✓		

The following gives a more precise report of the different definitions used in the FR Y14-Q reporting guidelines:

- 2011:Q3 to 2013:Q3 definition: page 7, field 18.[40] *The date a credit facility becomes a legally binding agreement. If the credit facility has been renewed, use the renewal date as the Origination Date (except for extension options that were at the sole discretion of the obligor). The renewal date would include all credit actions that require bank approval and that change the contractual date of the obligation.*

- 2013:Q4 to 2014:Q3 definition: page 184, field 18.[41] *Report the origination date of the commitment. The "originationdate" is the date the commitment to lend becomes a legally binding commitment. If there has been a major modification to the loan that requires credit approval such that the contractual date of the loan is changed in the loan system, use the revised contractual date as the "origination date." The following examples would generally not result in a change in the contractual date of the loan in the loan system, and thus would not be considered major modifications:*

    - *extension options at the sole discretion of the borrower*

[40] See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=92c98f5c-df39-46c4-97b8-2621d997432f. The file in the `.zip` folder is called `/FR Y-14Q/Wholesale/FR_Y-14Q_CorpLoan_2Q12.pdf`.

[41] See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=2f122a09-cf30-49fe-8a51-5f33682c26c8.

- *covenants*
- *waivers*

- 2014:Q4 to present definition: page 192, field 18.[42] *Report the origination date. The origination date is the date the commitment to lend becomes a legally binding commitment. If there has been a major modification to the loan such that the obligor execute a new or amended and restated credit agreement, use the revised contractual date of the credit agreement as the origination date. The following independent examples would generally not result in a change in the contractual date of the loan, and thus would not be considered major modifications:*
  - *extension options at the sole discretion of the borrower*
  - *covenants*
  - *waivers*
  - *change in the maturity date*
  - *repricing*
  - *periodic credit reviews*

  Additionally, exclude all renewals which meet the definition in "RenewalDate" Field 91

- 2014:Q4 to present definition: page 222, field 91.[43] *If the credit facility has been renewed per the terms of the original loan agreement, re-priced, or has a change in the maturity date such that the Origination Date did not change, report the date on which the most recent renewal notification became effective. If a credit facility has been renewed as part of a major modification such that the contractual date of the original loan is changed, then such date would be reported in Field 18 (Origination Date) and the BHC should report 9999-12-31 in this field. If the credit facility has not been renewed the BHC should report 9999-12-31 in this field.*

A.1.2 Bankruptcy data

Data is from New Generation Research, Inc, Bankruptcy.com Premeium Susbscription. We use information on business bankruptcy filings for Chapter 7 and 11. The bankruptcy data is taken from the filings at state bankruptcy courts. We focus on Chapter 7 and 11 as they comprise the overwhelming majority of cases in our sample period. We merge the bankruptcy filings to the FR Y-14Q using quarterly dates, company names, 6-digit CUSIP, and zip code. Our matching algorithm sequentially matches borrowers in the following order. We first match the bankruptcy data to the FR Y-14Q by date-tin-name-zip, any unmatched observations then get matched by date-tin-name-CUSIP. We continue this matching procedure

[42] See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=7104872b-af71-4447-a59a-57956e39cafc.

[43] See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=7104872b-af71-4447-a59a-57956e39cafc.

with date-tin-name-state, date-tin-name, date-tin-zip, date-tin-CUSIP, date-name-zip, date-tin-state, date-name-state, date-tin, date-cusip, and ultimately date-name.

A.1.3 Shared National Credit (SNC) registry data

The SNC data has an annual frequency from May 2004 to May 2014. After that, the data are bi-annual, though the quarters of reporting vary from year to year. The reporting threshold changed from $20m to $100m (at origination) in January 2018. As a result, there is a significant drop in the number of loans from 2018:Q1 to 2018:Q3 (the next observation) from about 11,500 observations for `snc_credit_ids` (the SNC identifier, described below) to about 8500. Even though there are two reviews per year, some loans are only audited once a year. For example, of the loans originated before 2018, only about 70 percent appear in 2018, the remaining 30 percent only once. Like in the FR Y-14Q, loans in the SNC do not necessarily show up on their quarter of origination. Each loan-by-time observation is classified as either non-compliant if the borrower has breached a covenant threshold as of the end of the year, or compliant after receiving a waiver or an amendment if the borrower has not breached a covenant threshold after it was reset, but would have otherwise breached it (if it had not been reset) as of the end of the year. We classify a borrower's loan covenants to be binding in a given year if the borrower is either non-compliant or compliant after receiving a waiver or an amendment on one of its credit agreements in that year.

The following listing compares the concepts of loans, agents, and participants across the FR Y-14Q and the SNC data.

Definition	SNC (`snc_credit_id`×year or half-year)	FR Y-14Q (`loanID`×quarter)
Loan	`snc_credit_id` is formally a *credit* which is any loan or commitment to extend credit, or group of commitments, aggregating $100 million or more at origination; and committed under a formal lending arrangement; and shared by three or more unaffiliated supervised institutions.[44] A non-bank subsidiary of a holding company is considered a supervised institution	`loanID` is a loan or lease with a committed balance greater than or equal to $1 million reported at the credit facility level. For purposes of this collection, a credit facility is defined as a credit extension to a legal entity under a specific credit agreement
Agent	`agent_submission_entity_id` never more than 1 agent per credit; agent is also a participant in 92% of loans and the review bank for 90%[45]	`participationflag` lead bank in a syndication
Participant	`participant_rssd_id` each participant has one entry per t for a given `snc_credit_id`	`participationflag` lender in a syndication

Our merge procedure takes into account the following points:

- `snc_credit_id` is a superset of `loanID` because `snc_credit_id` in the SNC identifies the syndicate while `loanID` in the FR Y-14Q identifies the tranches of each syndicate.

[44] These are financial institutions subject to regulation by one of the three regulatory agencies.

[45] For 90% of the loans a review bank is also a participant.

All FR Y-14Q statistics are computed at the level of `snc_credit_id` which is populated from the SNC merge. One `snc_credit_id` can correspond to multiple `loanIDs`.

- In theory, the agent and review banks' internal ID should correspond to `sncinternalcreditid` in the FR Y-14Q. In practice, this does not always hold. Therefore, we merge sequentially, based on the following combinations of ids and obligor variables:

  1. `bhc snc_credit_id date`
  2. `bhc sncinternalcreditid date`
  3. `o_name bhc date committed`
  4. `o_name bhc date o_zip5`
  5. `o_name bhc date o_zip5 dup`
  6. `o_name bhc date originationdate_w`
  7. `o_name bhc date originationdate_w dup`
  8. `o_name bhc financialsdate committed`
  9. `o_zip5 bhc date committed`
  10. `o_zip5 bhc date originationdate_w`

Appendix Table A-5 reports summary statistics on the merge. The top panel shows the merge between the SNC sample and the FR Y14-Q, while the bottom panel shows the merge between the SNC covenant review sample and the FR Y14-Q.

A.1.4 Dealscan data

The Dealscan data (Chava and Roberts, 2008; Schwert, 2018) is a dataset of loan syndications containing primarily information on loans at the time of their origination. The information is collected at both the syndicate and tranche levels. We are interesting in collecting information on whether the loan features a performance pricing grid. This information is encoded in the variables `performance_pricing`, `performance_pricing_grid` and `performance_pricing_remark`.

Merging Dealscan and the FR Y14-Q is challenging because there is no common identifier linking both. The basic unit of observation in the FR Y14-Q data is a loan, corresponding by a security held by a bank on its balance sheet. Each loan has flag for syndication status, as discussed above. Loans recorded in the FR Y14-Q may belong to different tranches of the same syndication in Dealscan. However, the FR Y14-Q does not provide an identifier across loans belonging to each syndication, or to particular tranches of a syndication. On the other hand, while Dealscan records the list of participants to each tranche of each syndication. However, it does not contain information on how each tranche are allocated across participants, so that we cannot use committed exposure to identify loans in the FR Y14-Q to tranches in Dealscan. As a consequence, we pursue 2 merge strategies to merge the Y-14 and

Dealscan:

- Strategy 1: We merge loans from the FR Y14-Q to syndication tranches in Dealscan based on borrower name, weekly origination date (weekly) and bank name. To do so, we only keep observations (loans in the FR Y14-Q and syndications in Dealscan) that are uniquely identified by these 3 variables. To see the potential issues with this merging procedure, suppose that in Dealscan, a bank participates in several tranches in a syndicated deal to a particular firm in a particular week. Using our procedure, in the Dealscan data, the (borrower name, bank name, date) combination would identify a unique syndication. In the FR Y14-Q, it would identify two different loans. As a result, in the FR Y14-Q, we would drop the two observations, but in Dealscan we would keep the syndication, and we would fail to merge, despite the tranches being in the FR Y14-Q and the syndication being in Dealscan. We thus think this is a lower bound a merge.

- Strategy 2: This approach is the same, but keeps all FR Y14-Q loans that the previous approach had discarded. That is, we keep FR Y14-Q loans that are not uniquely identified by name, bank, origination week. The issue with this merge is that it might create false positives, by improperly attributing an FR Y14-Q loan between a (bank, borrower) pair in a given week to a particular syndication. This approach should yield an upper bound on the number of potential merges.

The results reported in Appendix Tables A-7-A-9 are constructed using Strategy 1. The results using Strategy are qualitatively similar and quantitatively close; they are available upon request.

A.2 Loan modifications during COVID

Appendix Figure A-1 shows that modification rates were unusually elevated after the start of the COVID pandemic. Total modification rates spiked in 2020:Q1, particularly for SD loans. Since then, modification rates of SD loans have trended slightly upward, reaching approximately 25% of all loan-quarter observations in 2022:Q1 (our last quarter of data), compared to the 20% average modification rate for these loans pre-COVID.

The top panel of Appendix Figure A-5 focuses on the period ranging from 2019:Q1 to 2022:Q1, and reports the rates of renewals and re-originations in our data. In contrast to modification rates, neither of these types of events show a surge in frequency during or after the COVID pandemic. This suggests that, to the extent that lenders used loan flexibility to provide relief to their borrowers, this was done through modification of key loan terms as opposed to a general overhaul of credit agreements. Consistent with the rest of our analysis,

lenders seem to have offered more flexibility to SD borrowers than SL borrowers during this period.

In Appendix Figure A-6, we show that this change in modification rates is robust to controlling for borrower, lender, sector and maturity at origination. Specifically, we estimate a specification of the form:

$$Y_{i,t} = \gamma_{m,j,b} + \delta_t + \varepsilon_{i,m,j,b,t} \tag{A1}$$

restricted to the sample of 2019:Q1 to 2020:Q4, for loan i, borrower j, lender b, maturity at origination m, and quarterly date t. In Appendix Figure A-6, we report estimates of the time effects δ_t, using 2019:Q4 as the omitted category. In the top panel, the dependent variable is a dummy for whether the loan experiences a maturity extension; in the middle panel, the dependent variable is a dummy for whether the loan experiences a modification in interest rates; and in the bottom panel, the dependent variable is a dummy for whether the loan experiences a renewal. The main result is that most modifications appear to have taken the form of changes in interest rates; maturity extensions do not exhibit a significant change, while renewals exhibit a significant but economically small change. Appendix Figure A-7 confirms this result, accounting for potential fixed calendar quarter effects on modification and re-origination rates. Namely, in the sample restricted to 2017:Q1 to 2020:Q4, we estimate:

$$Y_{i,t} = \gamma_{m,j,b} + \sum_{q=1}^{4} \mathbf{1}\{q(t) = q\} \left(\alpha_q + \mathbf{1}\{t \geq 2020 : Q1\}\delta_q\right) + \varepsilon_{i,m,j,b,t} \tag{A2}$$

where $q(t)$ denotes the quarter corresponding to date t. Appendix Figure A-7 reports the point estimates for $\{\delta_q\}_{q=1}^{4}$, which represent the incremental likelihood of re-origination (top panel) and interest rate changes (bottom panel) compared to the average rates for that quarter over the 2017-2019 period. The top panel shows that, if anything, re-originations fell slightly compared to pre-COVID. Interest rate changes increased significantly (about 3p.p. higher, relative to a baseline of about 15%), though the increase was concentrated in 2020:Q1 and 2020:Q2. Thus overall, COVID was marked by an increase rate of loan modifications, particularly interest rate changes, and particularly among SD borrowers.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$		$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$		$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$	
$D_{l,t}^{(-)}$	5.2	4.2	4.4	4.1	1.7	0.8
	(0.29)	(0.59)	(0.24)	(0.46)	(0.18)	(0.37)
$D_{l,t}^{(-)} \times \mathbf{1}\{\text{Syndication}\}_l$	3.7	4.6	−2.8	−1.1	6.4	6.2
	(0.54)	(1.33)	(0.32)	(0.57)	(0.52)	(1.25)
mean rate	14.5%	14.5%	6.7%	6.7%	9.1%	9.1%
lender × quarter f.e.	✓	✓	✓	✓	✓	✓
sector × quarter f.e.	✓	✓	✓	✓	✓	✓
borrower × quarter f.e.	✗	✓	✗	✓	✗	✓
maturity at orig. f.e.	✓	✓	✓	✓	✓	✓
loan f.e.	✓	✓	✓	✓	✓	✓
borrower controls	✓	✓	✓	✓	✓	✓
# S&P rating categories	21	3	21	3	21	3
# obs	2159k	2159k	2159k	2159k	2159k	2159k
# loans	250k	250k	250k	250k	250k	250k
# borrowers	84k	84k	84k	84k	84k	84k

Table A-1: Financial distress and loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (3). For each of the three outcome variables, we consider specifications for 1) rating changes across the 21 S&P rating categories and 2) rating changes across a smaller set of 3 main rating category changes (investment-grade, non-investment-grade, junk). The variable $D_{l,t}^{(-)}$ is a indicator that is equal to 1 if the relevant loan rating of the loan declines between quarters $t-1$ and t. The line "mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first two columns, a modification is defined as either a maturity extension, or a change in interest rates. Section 2 and Appendix A.1 provide more details on the definition of variables, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

		# obs.	# loans	# borrowers	# banks
1	Drop observations with `date` after 2022:Q1	12,509,702	1,276,421	428,965	42
2	Drop if originated after 2022:Q1, matured before 2011:Q3, or a foreign firm	10,092,271	1,016,640	343,423	41
3	Drop banks that are acquired	9,675,978	977,920	334,003	38
4	Drop banks with $<$ 100 loans per quarter	9,538,967	956,471	324,791	31
5	Drop loans observed for only one quarter, obs. before 2012:Q3	9,461,287	878,791	307,863	31
6	Drop NAICS-2 industries FIRE, Construction, Utilities; loans in a SPV	6,131,430	548,446	215,689	30
7	Drop loans not continuously observed	5,758,311	522,006	207,029	30
8	Drop loans where `interestrate`, `committed`, `originationdate`, `spread`, or `utilized` is missing for all observations	5,674,474	509,816	203,082	29
9	Drop loans with negative `interestrate`, `committed`, `utilized` or missing `securitytype`	5,572,398	501,938	201,185	29
10	Drop loans with a decreasing `originationdate`	5,478,156	496,594	199,614	29
11	Drop loans observed after maturity	5,444,792	493,886	198,498	29
12	Drop firms with `totalssetscurrent`, `netsalescurrent`<0	5,276,763	483,626	196,037	29
13	Drop loans that never exit the syndication pipeline	5,135,308	468,587	192,152	29
14	Drop loans where initial maturity is always missing	4,595,670	426,367	171,935	29
15	Drop loans originated before 2012:Q1	3,307,116	336,795	135,736	29

Table A-2: Sample selection steps. The third column reports the number of observations before the drop step described in each line. The fourth, fifth and sixth columns report, respectively, the remaining number of unique loans, borrowers, and banks in the sample.

	mean	s.d.	p5	median	p95	Nr. of entities
Panel A: Loan-level						
Initial maturity (qtrs.)	20.8	21.2	3.0	20.0	50.0	337k
Maturity remaining (qtrs.)	16.6	19.8	1.5	13.6	42.5	337k
Interest rate spread (bps.)	171	133	0	175	400	337k
Loan/asset ratio	0.485	2.047	0.001	0.055	1.370	265k
1{Syndication}	26.4	44.1	0	0	100	337k
1{Line}	40.6	49.1	0	0	100	337k
1{Fixed-rate}	30.3	45.2	0	0	100	337k
1{Secured}	85.6	34.0	0	100	100	337k
Panel B: Borrower-level (all borrowers)						
Initial maturity (qtrs.)	24.3	25.1	4.0	20.0	80.0	136k
Maturity remaining (qtrs.)	19.8	23.7	1.9	13.5	70	136k
Interest rate spread (bps.)	182	124	0	192	382	136k
Loan/asset ratio	0.762	2.476	0.001	0.193	2.621	91k
1{Syndication}	9.1	27.4	0	0	100	136k
1{Line}	38.6	44.5	0	0	100	136k
1{Fixed-rate}	34.01	44.2	0	0	100	136k
1{Secured}	91.9	24.6	0	100	100	136k
Panel C: Borrower-level (public borrowers)						
Initial maturity (qtrs.)	16.9	6.2	4.0	18.7	24.5	3k
Maturity remaining (qtrs.)	12.7	5.3	3.1	13.1	19.8	3k
Interest rate spread (bps.)	145	107	0	138	339	3k
Loan/asset ratio	0.235	1.000	0.001	0.020	1.036	1k
1{Syndication}	62.24	39.2	0	79.9	100	3k
1{Line}	68.1	31.5	0	74.8	100	3k
1{Fixed-rate}	16.3	26.1	0	4.5	88.7	3k
1{Secured}	70.4	37.0	0	91.0	100	3k

Table A-3: Additional summary statistics at the loan-by-quarter level. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. Panel A reports summary statistics on the distribution of loan characteristics across all loan-by-quarter observations. In this case, the column marked "Nr. of entities" is the total number of loans in the sample. Panel B reports the summary statistics on the same variables, after taking a weighted average of outstanding loans at a point in time within each borrower, where the weights are committed exposures. In this case, the column marked "Nr. of entities" is the number of borrowers. Panel C reports the same summary statistics restricted to the sample of borrowers that can be matched to Compustat.

	# borrowers	# loans	% not modif.	% modified		
				before bankruptcy	during bankruptcy	after bankruptcy
All loans	129k	322k	59%			
Matched to bankruptcy data	1k	6k	52%	15%	24%	9%
All loans						
Single-lender	118k	240k	64%			
Syndication	11k	82k	46%			
Matched to bankruptcy data						
Single-lender	1k	3k	61%	12%	20%	7%
Syndication	0k	4k	45%	17%	27%	11%

Table A-4: Modification rates for all borrowers, and for those that enter bankruptcy and match to a loan in our sample of the FR Y-14Q dataset. 33,647 borrowers have non-missing assets in the bankruptcy data; of these, 915 can be matched to borrowers in the FR Y-14Q. The FR Y-14Q sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the FR Y-14Q sample. Modification rates are expressed as a fraction of all loans outstanding for each group of borrowers.

Panel A.	SNC sample ∩ Y14				SNC sample			
	p25	p50	p75	mean	p25	p50	p75	mean
Loan size ($ mn)	16.5	44.0	120.6	95.3	70.0	198.8	500.0	459.8
Facilities per loan (#)	1	2	3	2	4	8	17	50
Mat. at orig. (quart.)	16	20	20	18	15	20	20	22
# participants	27,448				30,184			
# loans	12,723				24,870			
# facilities	32,731				30,184			
% term loans	32				–			
% fixed rate	6				–			
% public	50				–			
Panel B.	SNC cov. sample ∩ Y14				SNC cov. sample			
	p25	p50	p75	mean	p25	p50	p75	mean
Loan size ($ mn)	13.3	36.0	98.0	80.5	72.41	198.00	497.5	422.82
Facilities per loan (#)	1	2	3	2	5	9	24	77
Mat. at orig. (quart.)	17	20	20	19	20	20	22	20
# participants	10,631				20,744			
# loans	4,913				10,368			
# facilities	13,219				20,744			
% term loans	33				–			
% fixed rate	7				–			
% public	47				–			

Table A-5: Summary statistics for the FR Y-14Q merged with the full SNC sample (Panel A) and the SNC covenant review sample (Panel B). The first group of columns reports summary statistics at origination for loans that are covered both in the SNC sample and in the FR Y-14Q sample. The second group of columns reports the same summary statistics at origination for the full SNC sample. The FR Y-14Q sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the FR Y-14Q sample.

Panel A: Syndication level	# loans	# modified	% modified
# loans with covenant violations	1661	1339	81%
# only waived	1311	1044	80%
# only enforced	114	95	83%
# both waived and enforced	236	200	85%
# loans with no covenant violations	3252	2316	71%
# total loans	4913	3655	74%

Panel B: Syndication-by-quarter level	# obs.	# modified	% modified
# obs. with covenant violations	1398	839	60%
# only waived	1159	707	61%
# only enforced	100	55	55%
# both waived and enforced	139	77	77%
# obs. with no covenant violations	3665	1915	52%
# total obs.	5063	2754	54%

Panel C: Interest rate changes	Δ IR, bps
Obs. with covenant violations	
only waived	16
only enforced	46
both waived and enforced	54
Obs. with no covenant violations	-14
All obs.	717

Table A-6: Modifications in the sample of syndications observed both in SNC and the FR Y14-Q. The FR Y-14Q sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the FR Y-14Q sample. Statistics are computed at the syndication level, which may correspond to multiple loans in the FR Y14-Q. Panel A treats each syndication as one observation. A modification is tabulated if any of the facilities or tranches has ever experienced a change in interest rate or maturity. "Only waived" is tabulated if at some point in the sample, the borrower would have breached a covenant absent a reset. "Only enforced" is tabulated if at some point in the sample, the borrower breached a covenant prior to reset. "Both waived and enforced" is tabulated if the borrower both breached a covenant and had a covenant reset during at some point in the sample. Never violated is tabulated if a borrower never breached nor reset a covenant. Panel B repeats the same tabulation, at the syndication-by-quarter level. The indicators for "waived", "enforced" and "both waived and enforced" are constructed by looking at the 6 months preceding the syndication-by-quarter observation. Given that the SNC sample is either twice yearly or yearly, it is possible for multiple covenant violations to occur in one reporting period. Panel C studies the same sample as Panel B, but reports information on the magnitude of interest changes for the subsample of syndication-by-quarter observations that experience an interest rate modification to one of their tranches.

	# loans	% loans with interest rate change	% loans with maturity extension
Panel A: Syndicated (SD) loans in Y14 ∩ Dealscan			
All loans			
No performance pricing clause	5306	51%	26%
Performance pricing clause	2684	39%	26%
t-test for diff. in means		(10.09)	(0.67)
Downgraded loans			
No performance pricing clause	550	71%	45%
Performance pricing clause	252	57%	46%
t-test for diff. in means		(6.31)	(-0.30)
Non-downgraded loans			
No performance pricing clause	4756	44%	20%
Performance pricing clause	2432	33%	19%
t-test for diff. in means		(8.08)	(0.74)
Panel B: All syndicated (SD) loans in Y14			
Not in Dealscan	96206	50%	22%
In Dealscan, no performance pricing clause	5306	51%	26%
t-test for diff. in means w.r.t. SD loans not in Dealscan		(-2.74)	(-7.22)
In Dealscan, performance pricing clause	2684	39%	26%
t-test for diff. in means w.r.t. SD loans not in Dealscan		(10.09)	(-4.42)

Table A-7: Modification rates and performance pricing: comparison of simple means. This table focuses on syndicated (SD) loans only. The FR Y-14Q sample contains syndicated loans originated after 2012:Q3 and active up to and including 2023:Q3. Panel A reports a comparison of means within the sample of syndications that we can successfully identify in both the Y14 and Dealscan (there are 7990 such syndications). The first two lines compare the set of loans with a performance pricing clause reported in Dealscan, to those with no performance pricing clause. The next two lines focus on loans that are downgraded from investment grade to junk while in the Y14 sample, and performs the same comparison. The last two lines of Panel A perform the comparison in the group of loans that are not downgraded. In Panel B, the sample is the combination of all SD loans in the Y14, with the set of loans from Dealscan that are successfully merged to the Y14, and for which we can therefore ascertain the presence of performance pricing clauses. Panel B is meant to clarify that the group of Y14 SD loans that successfully merge to Dealscan to not have statistically distinct modification rates from those that do not merge. The column marked "% loans with interest rate changes" reports the fraction of all loans that undergo at least one change in interest rates, while the column marked "% loans with maturity extension" reports the fraction of all loans that undergo at least one maturity extension. Statistics reported in parentheses are t-statistics for differences in means across subsamples.

$\mathbf{1}\left\{\begin{array}{c}\text{Performance}\\ \text{pricing}\end{array}\right\}_l$	$\mathbf{1}\{\text{At least one interest rate change}\}_l$				
	−10.42	−9.45	−10.87	−11.80	4.18
	(1.177)	(1.185)	(1.146)	(1.208)	(1.767)
lender f.e.	✓	✗	✗	✗	✗
sector f.e.	✗	✓	✗	✗	✗
maturity at orig. f.e.	✗	✗	✓	✗	✗
orig. date f.e.	✗	✗	✗	✓	✗
borrower f.e.	✗	✗	✗	✗	✓
# loans	7990	7928	7981	7990	6346

Table A-8: Performance pricing and loan modifications: comparison of conditional means. This table computes the probability of a loan experiencing at least one interest rate change, conditional on having performance pricing clauses, in the sample of Y14 syndicated (SD) loans successfully merged to Dealscan, and corresponding to the group of loans described in Panel A of Appendix Figure A-9. The FR Y-14Q sample contains syndicated loans originated after 2012:Q3 and active up to and including 2023:Q3. Each specification control for a different fixed effect (lender, sector, maturity at origination, origination date, borrower). The coefficient reported is the loading on an indicator for whether the loan features a performance pricing clause in the Dealscan data.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$			$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$			$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$		
$\mathbf{1}\left\{\begin{array}{c}\text{Syndication,}\\ \text{no Dealscan merge}\end{array}\right\}_l$	9.9	9.5	6.7	13.6	11.3	8.4	−3.6	−1.8	−1.9
	(0.24)	(0.29)	(0.38)	(0.23)	(0.26)	(0.34)	(0.10)	(0.16)	(0.23)
$\mathbf{1}\left\{\begin{array}{c}\text{Syndication,}\\ \text{Dealscan merge,}\\ \text{no performance pricing}\end{array}\right\}_l$	10.4	8.2	7.0	14.3	10.5	8.9	−3.7	−2.6	−2.1
	(0.37)	(0.44)	(0.44)	(0.37)	(0.39)	(0.39)	(0.15)	(0.22)	(0.26)
$\mathbf{1}\left\{\begin{array}{c}\text{Syndication,}\\ \text{Dealscan merge,}\\ \text{performance pricing}\end{array}\right\}_l$	4.6	6.3	4.8	8.0	8.5	6.7	−3.8	−2.6	−2.7
	(0.40)	(0.51)	(0.50)	(0.38)	(0.45)	(0.45)	(0.19)	(0.30)	(0.32)
mean rate	13.2%	14.6%	14.9%	4.2%	4.9%	5.1%	7.3%	8.7%	6.3%
lender × quarter f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
sector × quarter f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
maturity at orig. f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
loan controls	✗	✓	✓	✗	✓	✓	✗	✓	✓
borrower controls	✗	✓	✗	✗	✓	✗	✗	✓	✗
borrower × quarter f.e.	✗	✗	✓	✗	✗	✓	✗	✗	✓
# obs	3951k	1457k	1438k	3951k	1457k	1438k	3951k	1457k	1438k
# loans	393k	198k	186k	393k	198k	186k	393k	198k	186k
# borrowers	156k	72k	30k	156k	72k	30k	156k	72k	30k

Table A-9: Performance pricing and loan modifications: regression results. All specifications use data at the loan (l) by quarter (t) level. The FR Y-14Q sample contains syndicated loans originated after 2012:Q3 and active up to and including 2023:Q3. There are three dependent variables: loan l is modified in quarter t (either an interest change or a maturity extension); loan l has a maturity extension in quarter t; loan l has an interest rate change in quarter t. We classify loans in three groups: Y14 syndicated (SD) loans successfully merged to Dealscan and which have performance pricing grids in Dealscan (category 1); Y14 SD loans that are either successfully merged to Dealscan and do not have a performance pricing grid, or that are not successfully merged to Dealscan (category 2); and Y14 single-lender (SL) loans (category 3). The coefficients reported in the table are the loadings on a categorical variable for this classification, using SL loans (category 3) as the baseline category. The line "Syndication, no performance pricing" refers to loans in category 2, while the line "Syndication, performance pricing" refers to loans in category 3. For each dependent variable, we consider three specifications: a specification with no controls, which represents a simple comparison of means across loan categories; a specification with lender by quarter, sector by quarter, and maturity fixed effects, along with loan and borrower controls; and a specification with borrow by quarter fixed effects. The standard error reported in parentheses are double-clustered by borrower and quarter.

Panel A.	Initial terms		Modifications at re-origination				
	All loans	Re-originated loans	% modif.	% incr.	mean incr.	% decr.	mean decr.
Interest rate (p.p.)							
All loans	1.70	1.71	12	6	0.72	6	−0.65
Single-lender	1.65	1.58	12	6	0.72	6	−0.74
Syndications	1.85	1.96	11	5	0.70	6	−0.47
Maturity (y)							
All loans	5.44	3.85	56	54	1.86	2	−2.63
Single-lender	5.79	3.69	58	56	1.73	2	−3.03
Syndications	4.52	4.18	52	50	2.18	2	−1.52

Panel B.	Initial terms		Modifications at renewal				
	All loans	Renewed loans	% modif.	% incr.	mean incr.	% decr.	mean decr.
Interest rate (p.p.)							
All loans	1.70	1.64	9	5	0.75	4	−0.63
Single-lender	1.65	1.52	9	5	0.82	4	−0.69
Syndications	1.85	1.92	10	5	0.59	5	−0.53
Maturity (y)							
All loans	5.44	5.01	52	51	1.55	1	−2.82
Single-lender	5.79	4.92	55	54	1.41	1	−2.97
Syndications	4.52	5.22	46	45	1.98	1	−2.42

Table A-10: Revisions of credit agreements: summary statistics. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. We use the data at the loan level in both panels. In Panel A, Columns 2 and 3 tabulate the average spread and maturity at origination for all loans, and for those that are re-originated at some point, respectively. Columns 4, 6, and 8 tabulate the percentage of loans that undergo a modification when re-originated and the direction (increase or decrease) of either a change in interest rate spreads or maturity. Columns 5 and 7 detail the average size of a change in a spread or maturity at re-origination. Panel B repeats this exercise for loan renewals.

	$\mathbf{1}\{\text{Re-origination}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_l$	0.2	0.3	0.4
	(0.07)	(0.01)	(0.10)
Mean rate	1.2%	1.2%	1.2%
	$\mathbf{1}\{\text{Renewal}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_l$	−0.3	1.0	0.8
	(0.15)	(0.09)	(0.16)
Mean rate	3.6%	3.6%	3.1%
lender × quarter f.e.	✗	✓	✓
sector × quarter f.e.	✗	✓	✓
borrower × quarter f.e.	✗	✗	✓
maturity at orig. f.e.	✗	✓	✓
loan controls	✗	✓	✓
borrower controls	✗	✓	✗
borrowers with SL and SD loans	✗	✗	✓
# obs	2069k	1367k	525k
# loans	245k	177k	70k
# borrowers	102k	60k	5k

Table A-11: Syndication status and revisions to credit agreements. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1, but starts in 2014:Q4 because of the change in the definition of the re-origination variable. There are 29 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (1). The line "Mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. We consider specifications with no independent variables other than syndication status, a saturated specification, and one restricted to firms that have at least one single-lender and one syndicated loan. In the saturated specification, the loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; and indicator for whether the loan is fixed-rate; and the ratio of committed exposure to total assets of the borrower. The borrower-level controls are: the ratio of current assets to total assets; the ratio of net income tot total assets; the ratio of book debt to total assets; and an indicator for whether the borrower is a publicly traded firm. In specification restricted to firms that have at least one single-lender and one syndicated loan, we included we include the same loan-level controls as in the saturated specification. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, and on the classification of loans between single-lender and syndicated. Additionally, Appendix Table A-3 contains summary statistics for the regression sample and a comparison of key financial ratios in our sample to the sample of Compustat non-financial borrowers.

	# loans	# obs	% distressed	Modification		Mat. extension		IR change	
				% distr.	% not distr.	% distr.	% not distr.	% distr.	% not distr.
All loans	337k	3,307k	4%	2%	11%	1%	5%	1%	6%
Single-lender	248k	2,458k	4%	2%	11%	1%	5%	1%	6%
Syndications	89k	849k	4%	2%	11%	1%	5%	1%	7%

Table A-12: Evergreening. The table describes the relationship between loan modifications and financial distress. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. Financial distress is defined as a deterioration in a loan's internal credit rating of by 1 on a scale of 1 to 10. The fractions reported under "Modification", "Mat. extension", and "IR change" add up to the total fraction of loan-quarter observations that are modified, received a maturity extension, or experienced a change in interest rates. A modification is defined as either a maturity extension or a change in interest rates.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$	$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$	$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$
$\mathbf{1}\{\text{Syndication}\}_l$	8.5	−1.9	10.7
	(0.34)	(0.15)	(0.32)
$\mathbf{1}\{\text{Multi-loan borrower}\}_l$	−0.6	−1.1	0.53
	(0.13)	(0.09)	(0.10)
$\mathbf{1}\{\text{Syndication}\}_l \times$	1.3	1.2	0.2
$\mathbf{1}\{\text{Multi-loan borrower}\}_l$	(0.33)	(0.15)	(0.31)
mean rate	12.8%	8.5%	7.9%
lender × quarter f.e.	✓	✓	✓
sector × quarter f.e.	✓	✓	✓
maturity at orig. f.e.	✓	✓	✓
# obs	3112k	3112k	3112k
# loans	311k	311k	311k
# borrowers	130k	130k	330k

Table A-13: Creditor dispersion and loan modification rates. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (1) with an additional indicator for whether or not the borrower associated with a loan has multiple loans and hence multiple banking relationships. The line "mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first column, a modification is defined as either a maturity extension or a modification of interest rates. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

Panel A.	% Single-lender (SL) loans	% Syndicated (SD) loans
No audit	42.8%	5.3%
Audit	30.7%	21.1%
No financials update	13.9%	2.5%
Financials update	59.6%	24.5%

Panel B.	% Single-lender (SL) loans	% Syndicated (SD) loans	*t*-stat
Total # audits / Total # of obs. for loan	11.0%	26.0%	-209.1
Total # financial updates / Total # of obs. for loan	30.0%	44.0%	-146.4
# audits in last year/ Total # of obs. for loan	3.2%	3.5%	-6.4
# financial updates in last year/ Total # of obs. for loan	7.9%	5.3%	42.6

Table A-14: Financial information sharing and syndication status. Both panels are constructed at the loan level. There are 392531 loans in the sample. Panel A shows how likely different loan types are to be audited between origination and termination, and how likely the borrower is to update their financial between origination and termination. The numbers reported are percentages of the total number of loans in the sample. For each sorting of the loans (No audit/Audit, Financials update/No financials update) the numbers should add up to 100%, up to rounding error. Panel B shows the number of observations where financials are newly audited, and the number of observations where the borrower updates their financial, as a fraction of the total number of quarters between origination and termination. In the top part of the panel, the numerator in these ratios is the total number of events; in the bottom part of the panel, the numerator is the number of events occurring during the last year before the termination of the loan. T-statistics for differences of means are reported in the last column.

Figure A-1: Time series of modification rates. The top panel reports quarterly modification rates from the sample of loan-quarter observations. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. A loan is flagged as modified in quarter t if it experiences a change in either interest rate (or interest rate spread, for floating rate loans), or a change in maturity date, from quarter t to quarter $t-1$. The bottom panel reports modification rates in the subsample of SD loans (solid green line) and of SL loans (dashed red line).

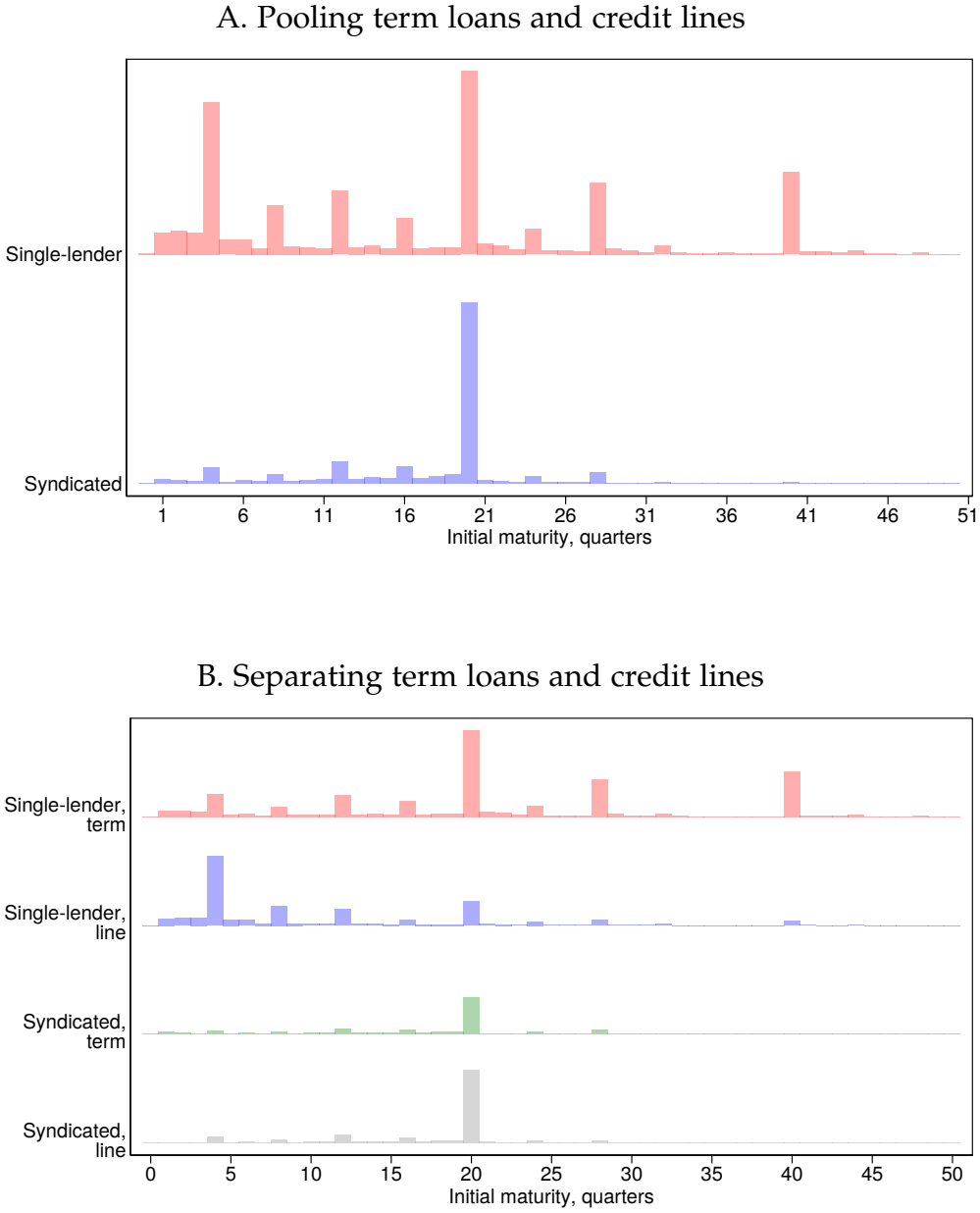


Figure A-2: The distribution of maturity at origination. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. In both panels, maturities on the horizontal axis are expressed in quarters. Panel A shows the distribution of maturity at originations for all loans in our final sample, distinguishing between SL loans (red) and SD loans (blue). Panel B also shows the distribution of maturity at origination for each loan group, but separates term loans from credit lines.

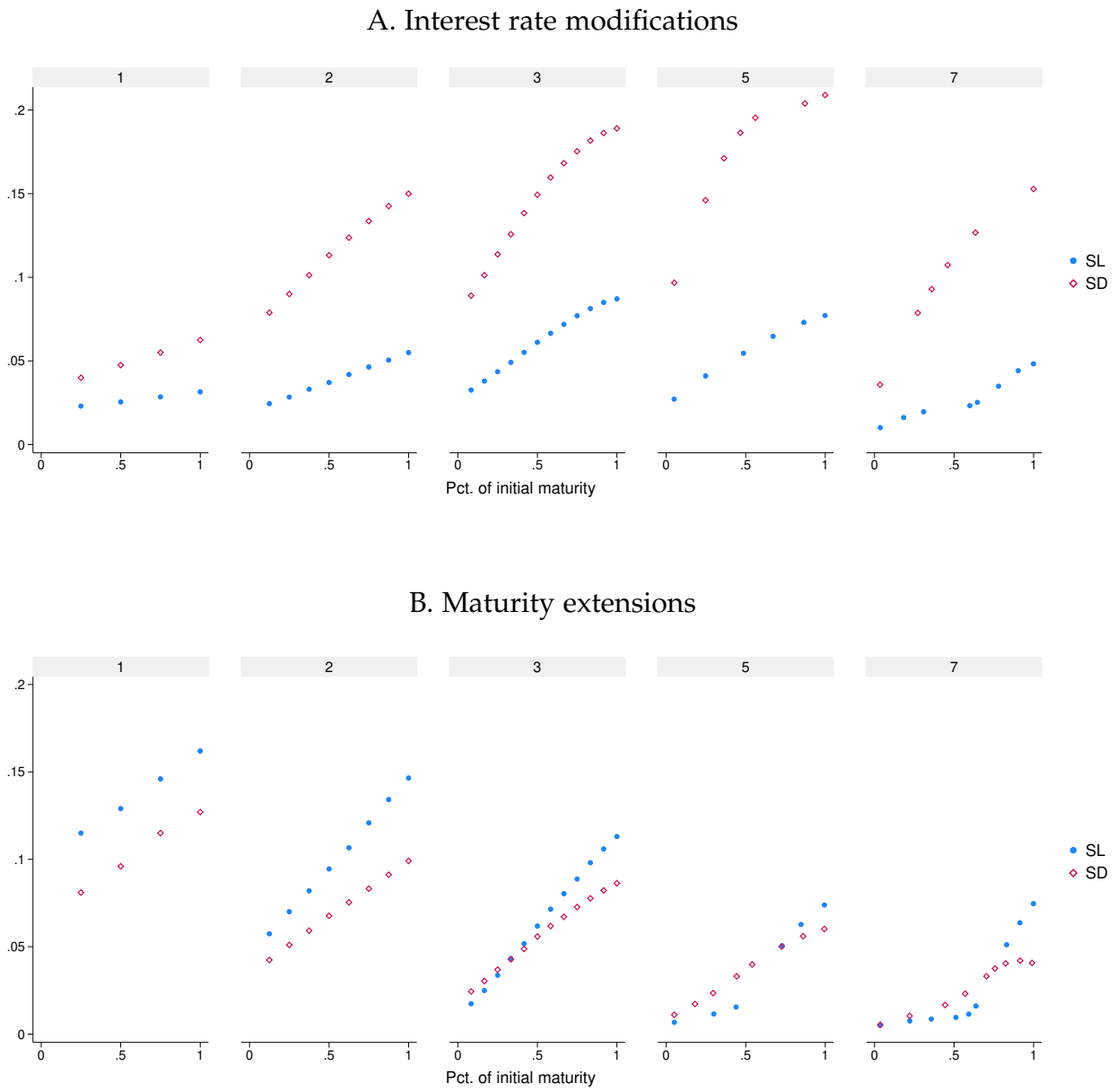
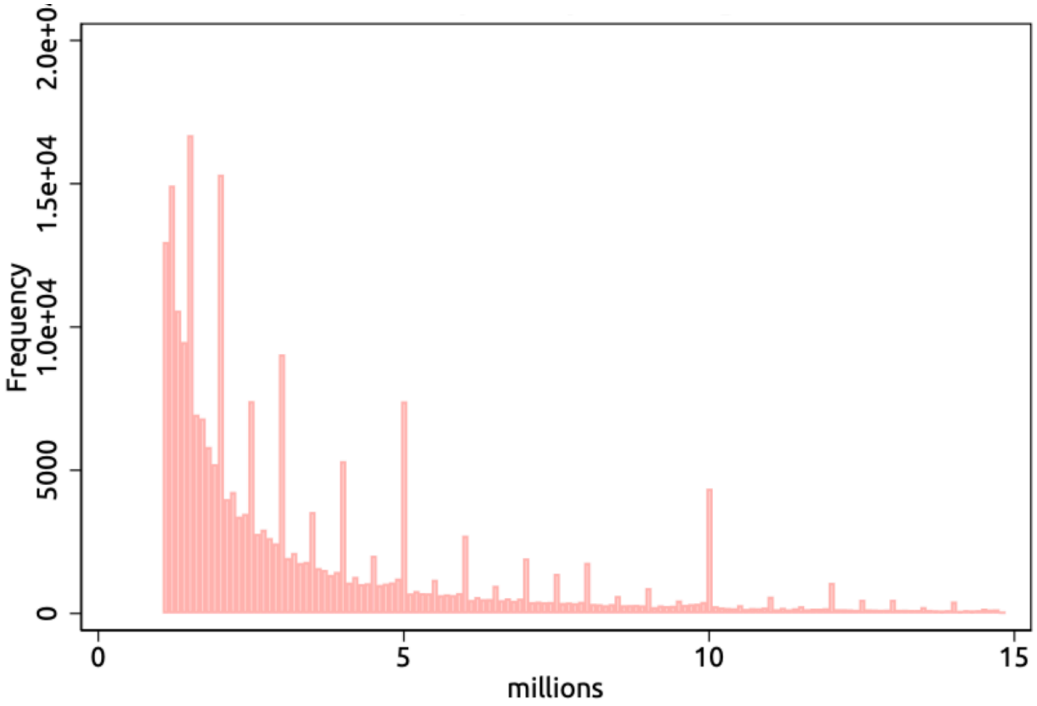


Figure A-3: The timing of loan modifications as a fraction of initial maturity. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. Panel A shows interest rate changes, and Panel B shows maturity extensions. Each subpanel focuses on loans with different maturities at origination, with the number of years at origination indicated in the title of the subpanel. In each subpanel, the horizontal axis is time expressed elapsed since origination expressed as a fraction of the original maturity at origination. On the vertical axis, we report an estimate of the hazard rate of each event (interest rate change or maturity extension) using the Nelson-Aalen estimator of the hazard function. The red diamonds correspond to syndicated (SD) loans and the blue dots correspond to single-lender (SL) loans.

A. Single-lender (SL) loans



B. Syndicated (SD) loans

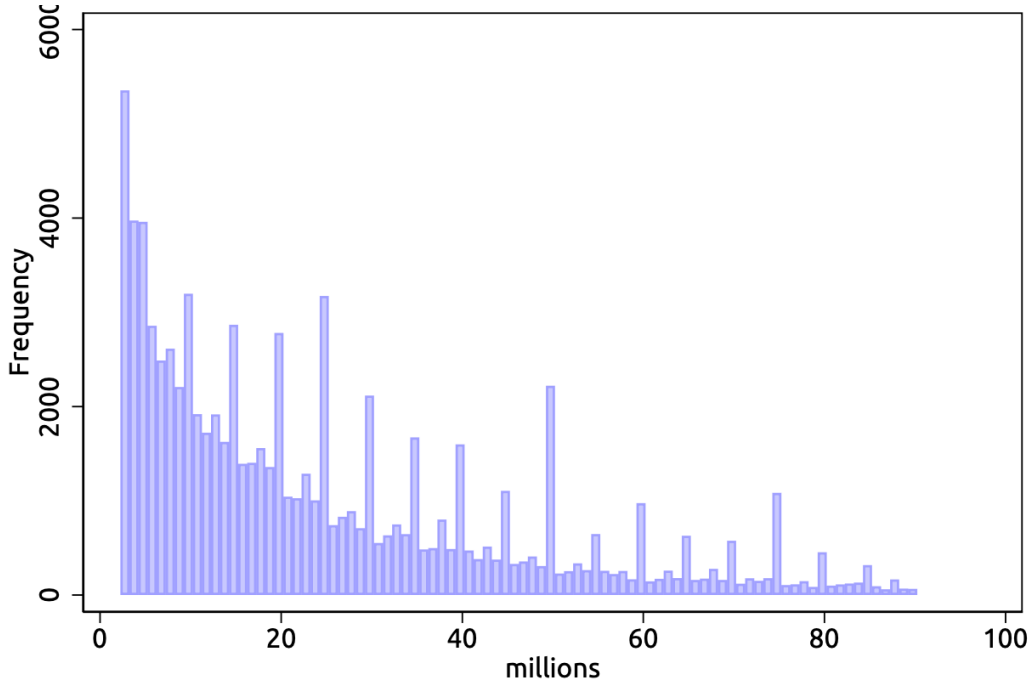


Figure A-4: The distribution of committed exposure (loan size) at origination. The sample contains loans originated after 2012:Q3 and active up to and including 2022:Q1. There are 29 banks in the sample. In both panels, commitments on the horizontal axis are expressed in millions of dollars. Panel A shows the distribution for single-lenders (SL) loans, and Panel B shows the distribution for syndicated (SD) loans.

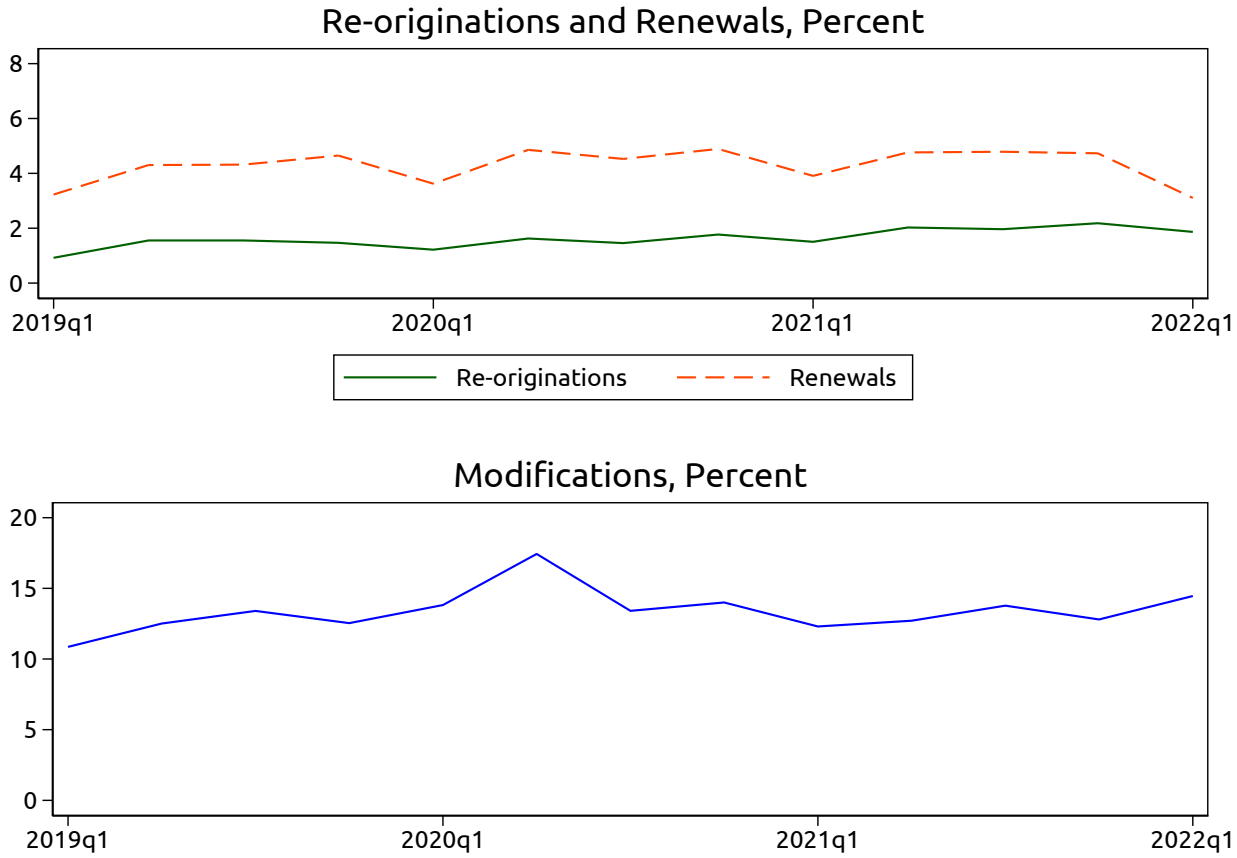


Figure A-5: Time series of re-origination and renewal rates (top panel) and modification rates (bottom) panel during the 2019:Q1-2022:Q1 period. The bottom panel reports the same data as Appendix Figure A-1, but focuses on the COVID period. A loan is flagged as modified in quarter t if it experiences a change in either interest rate (or interest rate spread, for floating rate loans), or a change in maturity date, from quarter t to quarter $t-1$. The top panel reports the time series for renewals and re-origination over the same period. For a definition of renewals and re-originations, see Section 4.1.3.

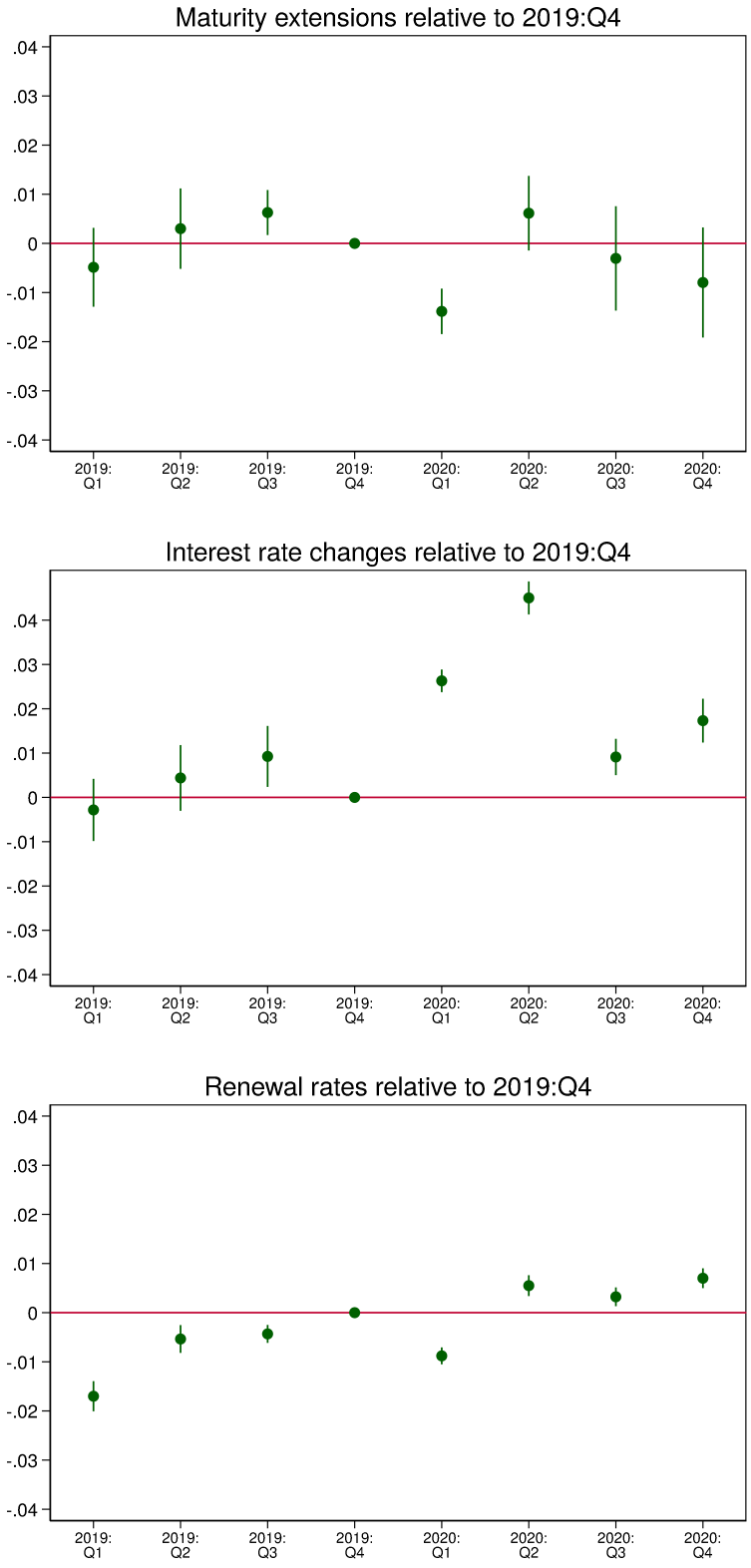


Figure A-6: Time effects in Equation (A1): $Y_{i,t} = \gamma_{m,j,b} + \delta_t + \varepsilon_{i,m,j,b,t}$ for loan i, in quarter t, with maturity at origination m, lender j, borrower b, and sector s. In the top panel, the dependent variable is an indicator for whether the loan experiences a maturity extension in quarter t. In the middle panel, the dependent variable is an indicator for whether the loan experiences a change in interest rate (or interest rate spread, for floating rate loans)in quarter t. In the bottom panel, the dependent variable is an indicator for whether the loan experiences a renewal in quarter t.

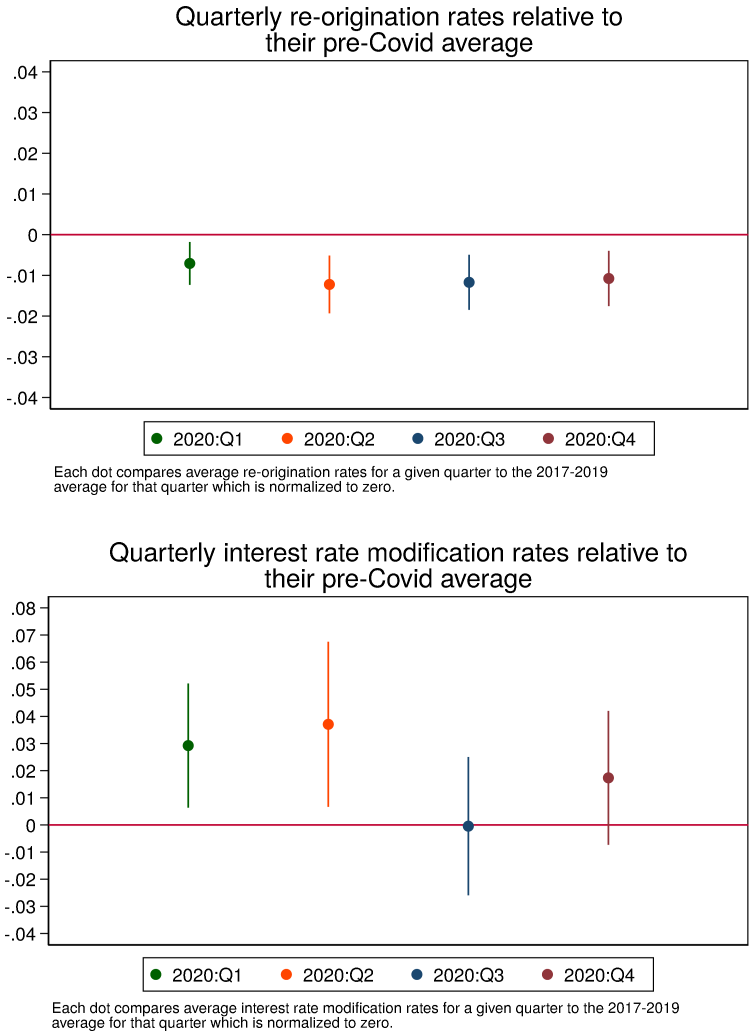


Figure A-7: Quarter fixed effects in Equation (A2). This specification compares re-origination rates (top panel) and the rates of changes in interest rates (or interest rate spreads, for floating rate loans) (bottom panel) in 2020:Q1 through 2020:Q4, to the corresponding modification rates in the same calendar quarters in 2017, 2018, and 2019, additionally controlling for borrower, lender, and maturity at origination fixed effects; see Appendix A.2 for more details.