Why Do Firms Pay More for Bank Loans? The Role of Renegotiation

Zhuolu Gao*

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Abstract

Firms borrowing from both banks and the corporate bond market pay a substantial premium on bank loans, raising questions about firms' bargaining power and banks' competition. In this paper, I show that a large portion of this premium compensates banks for facilitating out-of-court restructurings. I estimate the loan premium and use a 2014 U.S. court ruling, which impeded out-of-court restructurings, as a natural experiment. Following the ruling, affected firms experienced an 80–90 bps reduction in the loan premium, due to reduced restructuring opportunities and a diminished potential to avoid bankruptcy costs. These findings suggest that the renegotiation flexibility provided by banks is a key driver of the loan premium, highlighting the unique value that bank lending offers beyond the capital market.

JEL classification codes: G12, G21, G32

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1 Introduction

Firms borrow using two primary instruments, private bank loans and public bonds. One would expect firms to optimize their debt funding sources and choose the cheaper instrument if there were large spread differences. But surprisingly, as shown by Schwert (2020), banks are able to charge a substantially higher credit spread relative to the spread implied by the bond market, after adjusting for seniority. This interest rate premium, referred to as the 'loan premium', amounts to 140–170 bps and accounts for half of the total loan spread. This raises questions about both the supply and demand dynamics of the loan market: why are banks able to charge such a premium, and why are firms willing to pay more for bank loans despite having access to cheaper bond financing?

In this paper, I show that a significant portion of the loan premium can be explained by the renegotiation flexibility that banks offer during periods of financial distress. Specifically, banks' ability and willingness to facilitate out-of-court restructurings allow firms to avoid the substantial costs associated with formal bankruptcy procedures. Firms, therefore, are willing to compensate banks by paying a premium for this flexibility. Using a stylized binomial tree model, I analyze the decision-making processes of firms, banks, and bondholders under financial distress and show how renegotiation options offered by banks can generate the loan premium. The model demonstrates that an out-of-court restructuring—modeled as a one-period extension of the debt contract—saves bankruptcy costs but is also costly for banks to facilitate. When the expected gains from restructuring exceed the renegotiation costs, there is an interest rate containing a premium on which the bank and the firm can agree. This rate compensates the bank, and the firm prefers paying this rate to secure the renegotiation flexibility. Furthermore, the model suggests that the loan premium is heavily influenced by a firm's reliance on bonds. For bond-intensive firms, renegotiation outcomes are complicated by bondholders' tendency to resist renegotiation, making out-of-court restructurings more challenging.

To empirically test these implications, I first reproduce the loan premium following Schwert (2020). I construct a dataset of 10,851 syndicated loans to public firms from 1997 to 2022 and find that bank lenders charge a premium of around 95 bps compared to the public bond market.[1] After validating the existence of the loan premium, I explore the factors contributing to this premium, utilizing an unanticipated shock in 2014 (Court of the Southern District of New York, 2014). The court ruling, known as the Marblegate case, reshaped the market's perception by creating a new concern: it would become more difficult to implement out-of-court restructurings without unanimous consent. Evidence from Kornejew (2024) shows that the ruling has exacerbated hold-out problems in out-of-court restructurings, pushing more distressed firms—especially those heavily reliant on bonds—into formal bankruptcy procedures. This ruling creates an exogenous change in the feasibility of out-of-court restructurings, making it an ideal natural experiment to assess the impact on loan premium. Leveraging the shock, I conduct a difference-in-difference analysis: my findings indicate an 80–90 bps reduction in the loan premium for bond-intensive firms following the Marblegate ruling. This significant reduction suggests that when out-of-court restructuring becomes practically infeasible, the value of the renegotiation flexibility provided by banks diminishes, leading to a lower premium. This supports the hypothesis that the renegotiation flexibility of bank lending is a key factor driving the loan premium.

The result is further validated through a series of supplementary tests. Notably, when breaking down loans into different types, I find that the reduction in the loan premium due to the Marblegate ruling is less pronounced for loans associated with institutional lenders, whereas it is more significant for loans with only one lead arranger. This difference arises because renegotiation is typically easier and less costly when fewer parties are involved (e.g., Demiroglu and James, 2015). As a result, loans involving fewer parties experience a greater impact from the shock, which highlights that the loan premium is indeed driven by the renegotiation flexibility banks offer during financial distress.

In addition to the renegotiation flexibility, I show that a smaller portion of the loan premium (estimated at 20–30 bps) compensates for the prepayment flexibility that bank loans offer, whereas prepaying bonds is generally costly. Studies by Roberts and Sufi (2009) and Roberts (2015) demonstrate that when renegotiating prices of loan contracts, borrowers often demand

[1] When restricting the sample to term loans only, as in Schwert (2020), I find a loan premium of around 125–145 bps, which closely aligns with the original study's findings.

a lowering of interest rates, indicating that high-quality borrowers self-select to renegotiate prices. Using a two-period binomial tree model, I show that prepayment compensation should be higher for firms with a higher probability of improving credit quality. I conduct empirical tests and confirm that a higher loan premium can predict an improvement in a firm's credit rating, affirming the positive correlation between the premium and prepayment risk. These findings imply that standard loan fees (such as cancellation and upfront fees) do not fully compensate lenders for prepayment risk, as this risk is instead priced into the loan premium. In practice, over 90% of loans can be prepaid without any cancellation fee. While most syndicated loans include an upfront fee, the amount is often not disclosed to all syndicate participants or the public.[2] Since all lenders bear the prepayment risk, it is fair to compensate all syndicate members via the interest rate (the loan premium) rather than upfront fees, which are prioritized for lead arrangers.

Overall, I show that banks offer valuable flexibilities to firms beyond what the capital market can provide. First, banks create value by facilitating renegotiations during financial distress and receive compensation for this, which accounts for a large portion of the loan premium. Second, banks allow for prepayment and adjustment of existing debt according to changing conditions and therefore receive compensation, which accounts for a minor portion of the loan premium. Together, these forms of flexibility underscore the critical role that bank lending plays in addressing firms' changing financial needs, which explains and justifies the loan premium.

Other related literature

My paper contributes to the literature on banks' ability to create value for their borrowers. Banks perform valuable functions such as screening and monitoring (Leland and Pyle, 1977; Diamond, 1984; Ramakrishnan and Thakor, 1984; Fama, 1985), maturity and liquidity transformation, and risk diversification (Diamond and Dybvig, 1983), which can mitigate financial frictions. Another set of empirical papers provides indirect evidence of the value of bank lending. James (1987) shows that the stock market reaction to new loan announcements is positive.

[2] Berg et al. (2016) utilize hand-collected SEC filings of syndicated loan contracts and find that many loan contracts refer to a nonpublic fee letter without disclosing the upfront fee.

Berger and Udell (1995) find that borrowers with longer banking relationships pay lower interest rates and are less likely to pledge collateral. Bharath et al. (2011) also arrive at the conclusion that repeated borrowing from the same lender translates into a 10–17 bps lowering of loan spreads. Datta et al. (1999) find the existence of bank debt lowers the spreads for first public straight bond offers by about 68 bps. In particular, Hoshi et al. (1990) present evidence that relationship banking can reduce the costs of financial distress using data on Japanese firms. The saved costs stem from the inherent difficulty of renegotiating financial claims, particularly when there are many dispersed creditors. Gilson et al. (1990) also document the pattern that distressed firms that owe more of their debt to banks are more likely to succeed in out-of-court restructuring and avoid the presumably more costly Chapter 11 bankruptcy. In this paper, I provide empirical evidence showing that banks charge an interest rate premium for the saved distress costs. However, in the event of a shock that significantly increases the difficulty of renegotiation and restructuring, the premium vanishes.

This paper also speaks to the bank loan contract design. Gorton and Kahn (2000) argue that the initial loan rate is not set to price the risk of default, but rather to minimize subsequent costs associated with moral hazard and renegotiation. As originally discussed in Hart and Moore (1988), debt contracts are inherently incomplete. Roberts (2015) find that a typical bank loan is renegotiated five times throughout the loan life. The pricing, maturity, amount, and covenants are all significantly adjusted during each renegotiation. Denis and Wang (2014) find that even in the absence of covenant violations, there are frequent renegotiations, primarily relaxing existing restrictions and resulting in economically large changes in existing limits. Furthermore, Chodorow-Reich and Falato (2022) examine whether lenders' financial health can transmit to borrowers through the covenant violation channel. My paper confirms the pattern that the initial loan rate is subject to changes in conditions, rather than solely reflecting the credit risk.

More broadly, this paper relates to the research on debt structure and debtors' rights of firms. There are several explanations for the decision on the choices between public debt and private debt, such as the probability of inefficient liquidations, control of moral hazard problems, and the cost of disclosing proprietary information (Diamond, 1984, 1991; Chemmanur and Fulghieri, 1994; Hackbarth et al., 2007; De Fiore and Uhlig, 2011). More recently, Becker and Ivashina

(2014) empirically examine firms' debt choices between bank loans and public bonds, whereas Morellec et al. (2015) build a model of investment and financing decisions to study the choice between bonds and loans. This line of research focuses more on the quantity of new issues of debt while this paper focuses more on the prices of the two sources of debt. There is an essential difference between bond credit and loan credit in that loan credit is more concentrated with a few creditors based on a relationship, whereas bond securities are issued in the capital market, where many dispersed investors can buy and sell small positions. The misaligned motivations between dispersed bondholders and relationship banks can be costly for firms. First, the dispersed creditors suffer from a collective action problem, which can create the potential to hold out the debt and free-ride on others' concessions. Second, the debtor and its relationship lenders might take advantage of restructuring debt strategically (Gertner and Scharfstein, 1991; Brudney, 1992; Kornejew, 2024). This paper provides indirect evidence on how the misaligned motivations due to dispersed creditors can destroy stakeholders' value.

2 Model

In this section, I present models adapted from a standard binomial tree model of the short interest rate. The goal of the modeling is to provide a quantitative analysis of the different options embedded in loan contracts. The first part focuses on modeling the value of renegotiation flexibility during periods of financial distress. The second part examines the value of the prepayment option in a loan contract. These options capture different flexibilities offered by bank loans, and their value to borrowers justifies the premium banks can charge.

2.1 The value of distressed renegotiation

Consider the binomial tree in Figure 1, where the state variable λ denotes the short-term credit risk of a firm (the borrower). For simplicity, I assume a constant loss given default α throughout the duration of the debt. So, the credit spread is compensation for the expected credit loss, i.e., $\lambda = \alpha\rho$, where ρ is the short-term probability of default. Furthermore, I assume that the risk-free rate is zero. This assumption is sufficient since in most loan contracts, the interest rate risk is fully hedged through a floating interest payment schedule. Therefore, the interest rate fluctuation is not priced into this debt instrument.[3]

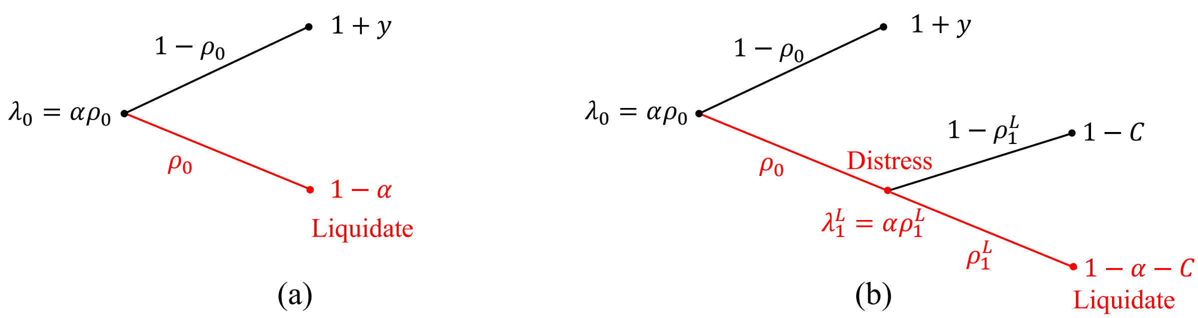


Figure 1: The one-period debt (Panel (a)) and the debt with an extension in distress (Panel (b)). The variable λ denotes the short-term credit risk of a firm. The highlighted branch denotes the distressed state when the firm is insolvent. In Panel (b), the bank agrees to extend the debt for one more period, as a result, the credit risk is restored to λ_1^L and the firm can avoid liquidation at time 1. At time 2, if the firm rehabilitates, the bank will receive the principal; but if the borrower remains insolvent, it will be liquidated and suffer from bankruptcy costs. I further assume that the bank incurs renegotiation costs C.

2.1.1 Benchmark debt

I begin by considering a one-period benchmark debt with the face value normalized to 1, with no renegotiation option. The left panel in Figure 1 depicts the one-period debt. When the debt matures, there are two possible outcomes: with probability $1 - \rho_0$ the firm is solvent, and the lender receives a repayment of $1 + y$. With probability ρ_0, the borrower is insolvent and forced to liquidate all assets, in which case the lender recovers $1 - \alpha$ of the face value. Given this repayment structure, I solve for the debt yield such that the current price of the debt is equal to the principal:

$$1 = (1 - \rho_0)(1 + y) + \rho_0(1 - \alpha). \tag{1}$$

The solution for the yield, denoted as y^*, is,

$$y^* = \frac{\alpha\rho_0}{1 - \rho_0}. \tag{2}$$

[3]Assuming the risk-free rate is a non-zero constant would not change the model implications.

The resulting yield reflects compensation for the expected loss given default to the lender.

2.1.2 Pure bank debt

Next, I consider the case where the firm borrows only from a relationship bank. This is prevalent, particularly among small firms without access to the corporate bond market. When firms face financial distress, liquidation can be costly for both firms and banks. Banks may prefer to renegotiate and restructure the debt to allow firms to rehabilitate. In the right panel of Figure 1, I consider a scenario where, instead of forcing the borrower to file for bankruptcy, the bank agrees to extend the debt for an additional period. This extension provides the firm with an opportunity to recover, which can ultimately be more beneficial for both the borrower and the bank.[4] I assume that after restructuring, the second-period default probability is ρ_1^L. If the firm deteriorates again with probability ρ_1^L, it will be liquidated at time 2, and the bank can recover $1-\alpha$ of the face value due to liquidation costs.[5] If the firm rehabilitates from distress with probability $1-\rho_1^L$, I assume that the bank will recover the full face value.[6] Therefore, if renegotiation can be reached without any cost, the bank can break even by charging a rate that satisfies the following equation:

$$1 = (1-\rho_0)(1+y) + \rho_0[\rho_1^L(1-\alpha) + (1-\rho_1^L)]. \tag{3}$$

The solution of Equation 3, denoted as $\underline{y}^*$, is given by

$$\underline{y}^* = \frac{\alpha\rho_0\rho_1^L}{1-\rho_0}, \tag{4}$$

which is smaller than y^*. This reflects that the credit risk of the borrower has been effectively decreased given the extension of debt.

[4]The assumption of extending the debt represents one feasible renegotiation outcomes. One could also model scenarios involving debt write-downs or exchange offers, which would provide similar insights that bank lending can mitigate bankruptcy costs through renegotiation.

[5]Later, I will discuss the possibility that $1-\alpha$ could be lower in the second period due to further deterioration, which could be considered as part of the renegotiation cost.

[6]The assumption simplifies the derivation. In Appendix A.1, I show that the key insights remain unchanged when assuming the bank recovers both the principal and the interest.

While extending the debt may reduce the credit risk, it also incurs costs for the bank. For example, banks need to assess the borrower's financial health and estimate the probability of rehabilitation. This process can be time-consuming and require the involvement of multiple professionals. Although the risk-free rate is assumed to be zero, the bank still incurs opportunity costs. Moreover, the assumption that the bank can recover $1-\alpha$ after two periods of deterioration may be optimistic, a smaller recovery is more likely and could be considered an additional cost. These costs would discourage banks from pursuing debt renegotiations. I model the cost incurred by the bank during the renegotiation process as C.[7] Anticipating the cost, the break-even condition for the bank to offer the renegotiation becomes:

$$1 = (1-\rho_0)(1+y) + \rho_0[\rho_1^L(1-\alpha) + (1-\rho_1^L) - C]. \tag{5}$$

The solution, denoted as y^*_{loan}, is

$$y^*_{loan} = \frac{\alpha\rho_0\rho_1^L}{1-\rho_0} + \frac{\rho_0 C}{1-\rho_0} = \underline{y}^* + \frac{\rho_0 C}{1-\rho_0}. \tag{6}$$

The break-even rate reflects that the bank is compensated for both the effective credit risk (due to renegotiation) and the renegotiation cost encountered. The bank is indifferent between receiving the benchmark rate y^* with no renegotiation, or offering renegotiation and receiving y^*_{loan}. Therefore, any rate equal to or above y^*_{loan} can motivate the bank to offer renegotiation. The question now is whether the firm may benefit from choosing a renegotiable loan, potentially at a higher interest rate. Therefore, I analyze the benefits of renegotiation from the shareholder's perspective. Figure 2 illustrates the shareholder's payoff, assuming the borrower's asset value at time t is V_t. The left panel shows the no-renegotiation scenario: at time 1, the shareholder repays the debt principal and interest rate y^* and receives the remaining asset in the solvent state; if default occurs, the payoff is zero. The right panel illustrates the cash flow under renegotiation: the shareholder agrees to pay a different rate y^*_{loan} and anticipates that the bank will allow for an extension when entering financial distress. If the firm deteriorates again at time 2, the shareholder's payoff is zero; if the firm recovers, the payoff becomes $V_2 - 1$, which

[7] The cost C may also include the rent that the bank charges for offering the renegotiation option.

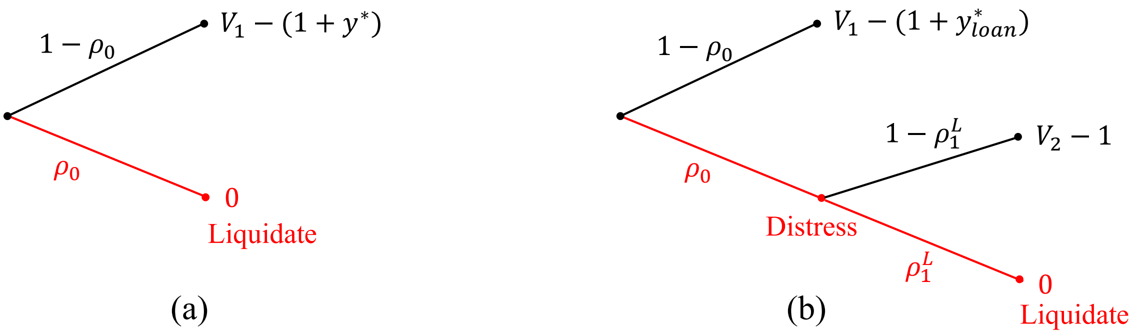


Figure 2: The shareholder's payoff without renegotiation (Panel (a)) and with an extension option (Panel (b)). The borrower's asset value at time t is denoted as V_t. Without the renegotiation, the shareholder pays back the debt principal and interest of y^*. When default happens, the shareholder gets nothing. If the shareholder is willing to pay y^*_{loan}, the bank will be motivated to extend the debt for one more period. In that case, the shareholder's payoff in both solvent and distress states changes accordingly.

is assumed to be positive. I then compare the equity claims with and without renegotiation, denoting the difference as ΔE:

$$\Delta E = (1-\rho_0)(y^* - y^*_{loan}) + \rho_0(1-\rho_1^L)(V_2 - 1). \tag{7}$$

The difference ΔE represents the benefit for the shareholder of choosing a renegotiable loan.[8] For a given y^*_{loan}, it is optimal for the shareholder to choose a renegotiable loan as long as $\Delta E > 0$, i.e.,

$$\rho_0(1-\rho_1^L)(V_2-1) > (1-\rho_0)(y^*_{loan} - y^*). \tag{8}$$

Here, the left-hand side, $\rho_0(1-\rho_1^L)(V_2-1)$, represents the potential value gain for the shareholder if the firm rehabilitates, which is always positive. The right-hand side reflects the cost of debt difference due to renegotiation. If $y^*_{loan} \leq y^*$, which holds when the renegotiation cost is low enough ($C \leq \alpha(1-\rho_1^L)$), the right-hand side is negative and the inequality always holds. Conversely, if $y^*_{loan} > y^*$ due to a high renegotiation cost, the shareholder needs to pay an interest rate higher than the benchmark debt rate. I show that the shareholder might still

[8]This is consistent with Christensen et al. (2014), where equity holders negotiate debt reductions under credible default risk, unlike in Mella-Barral and Perraudin (1997), where shareholders can reduce payments aggressively.

prefer the renegotiable loan if the value gain outweighs the additional interest cost. I define the highest loan rate that the firm is willing to pay by solving the equation $\Delta E = 0$ for y^*_{loan}, and denote the solution as $\bar{y}^*_{loan}$,

$$\bar{y}^*_{loan} = y^* + \frac{\rho_0(1-\rho_1^L)(V_2-1)}{1-\rho_0}. \tag{9}$$

This corresponds to a maximum renegotiation cost, denoted as $\bar{C}$:

$$\bar{C} = \alpha(1-\rho_1^L) + (1-\rho_1^L)(V_2-1). \tag{10}$$

If the cost exceeds $\bar{C}$, the bank cannot offer a renegotiable loan that is attractive to the shareholder. Conversely, if the cost is below $\bar{C}$, the bank can offer a loan with an interest rate y^*_{loan} that is preferable to the shareholder, even when y^*_{loan} is higher than y^*. Taking a closer look at $\bar{C}$, it represents the total benefit of renegotiation from the firm's stakeholders' perspective (see Appendix A.1). Specifically, I split it into two parts. The first part, $\alpha(1-\rho_1^L)$, can be considered as the saved liquidation cost for the debt holder in the distress state. The second part, $(1-\rho_1^L)(V_2-1)$, is the additional value created by the renegotiation for the shareholder in the distress state (this decomposition does not account for the solvent state). The total benefit governs the renegotiation that the renegotiation is always preferred by the shareholder when the total benefit exceeds the cost. Therefore, there is a non-monotonic relationship between the loan rate and the renegotiation cost, as depicted in Figure 3. I plot the loan rate (y_{loan}) against the renegotiation cost (C), taking into account the shareholder's decision. When the cost is too large, the renegotiable loan rate y^*_{loan} is too high for the firm to be willing to pay, which I denote as the no-renegotiation region. When the cost is very small, the shareholder only needs to pay a renegotiable loan rate y^*_{loan} that is lower than the benchmark rate, which I denote as the low-cost region. When the cost is moderate, the shareholder pays a rate higher than the benchmark rate to motivate the renegotiation, yet still benefits, which I denote as the moderate-cost region. The following proposition summarizes the conditions under which renegotiation occurs and how loan rates are adjusted.

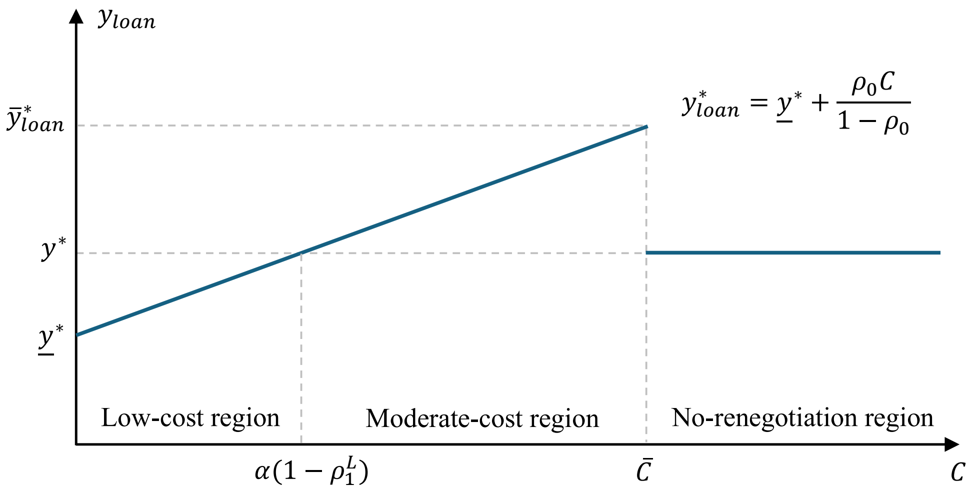


Figure 3: Loan rate and renegotiation cost. Renegotiation occurs only when the renegotiation cost is smaller than the total benefit of renegotiation ($C < \bar{C}$). This results in a non-monotonic relationship between the loan rate y_{loan} and C. It is also noteworthy that when the cost is small enough ($C < \alpha(1-\rho_1^L)$), the loan rate can be smaller than the benchmark debt rate without renegotiation.

Proposition 1. *In the pure bank debt framework, where the firm exclusively borrows from a relationship bank with the option to renegotiate under financial distress, the loan rate y_{loan} is determined as follows:*

- ***Without renegotiation:*** $y_{loan} = \dfrac{\alpha\rho_0}{1-\rho_0} = y^*$.
- ***With renegotiation:*** $y_{loan} = \dfrac{\alpha\rho_0\rho_1^L}{1-\rho_0} + \dfrac{\rho_0 C}{1-\rho_0} = y^*_{loan}$.

Furthermore, renegotiation is feasible when the bank offers a renegotiable loan rate y^*_{loan} that is attractive to shareholders, i.e., when the renegotiation cost C satisfies:

$$C < \bar{C} = \alpha(1-\rho_1^L) + (1-\rho_1^L)(V_2 - 1).$$

The pure bank model does not justify a loan premium because there is no bond involved, but it establishes the intuition that banks can charge a premium when renegotiation is preferable to firms.

2.1.3 Mixed borrowing without hold-out problem

Next, I consider the situation where the firm borrows from both a relationship bank and the corporate bond market, with the bank loan being senior to the corporate bond. This framework better reflects the empirical analysis, which compares loans and bonds issued by the same firm. I assume that both the loan and the bond are one-period coupon debts with their total face values summing to 1. Specifically, I denote the bond's face value as F_b, making the loan's face value $1 - F_b$. To begin with, I assume there is no hold-out problem, i.e., all bondholders always collectively agree with the restructuring plan initiated by the bank and the firm.

Figure 4 illustrates the cash flows for loan and bond repayments under scenarios with and without renegotiation. There is an implicit assumption that the bond borrowing fraction is smaller than the bankruptcy cost, $F_b < \alpha$. This assumption ensures that the loan is not fully risk-free and implies that, in the event of default, the expected loss rate on the junior debt (corporate bonds) is 100%.

First, I establish the benchmark yields for both the senior loan and the junior bond without renegotiation, which satisfy the following two equations, respectively:

$$1 - F_b = (1 - F_b)(1 - \rho_0)(1 + y) + \rho_0(1 - \alpha), \tag{11}$$

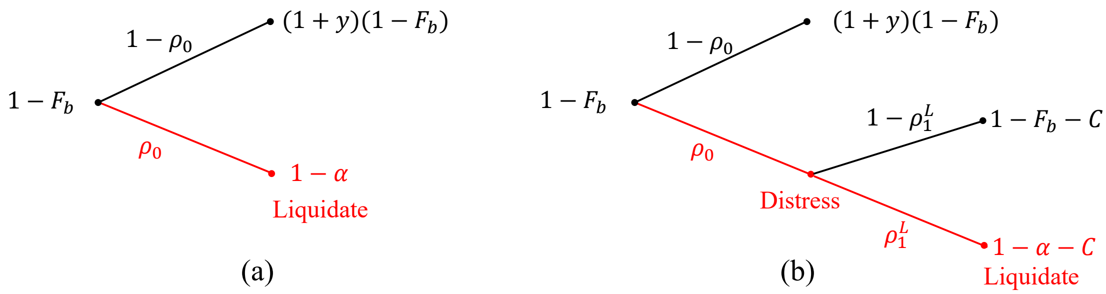
$$F_b = F_b(1 - \rho_0)(1 + y). \tag{12}$$

Denote the solution for the loan as y_l^*, for bond as y_b^*:

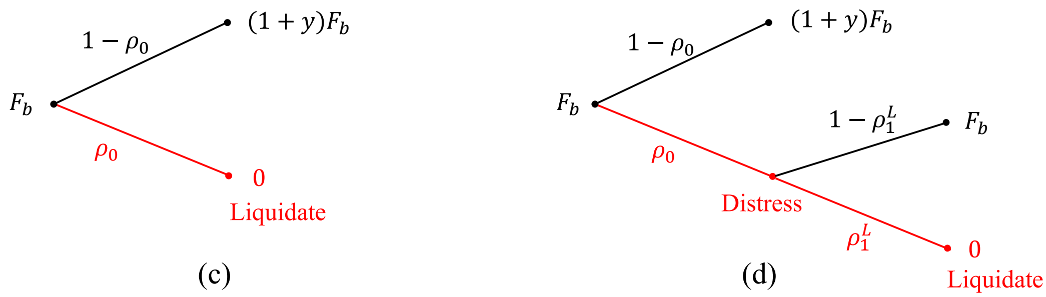
$$y_l^* = \frac{(\alpha - F_b)\rho_0}{(1 - F_b)(1 - \rho_0)}, \quad y_b^* = \frac{\rho_0}{1 - \rho_0}. \tag{13}$$

As expected, the bond yield y_b^* is higher than the loan yield y_l^* due to the bond's junior position. More straightforwardly, the ratio of the bond rate to the loan rate, $\frac{y_b^*}{y_l^*} = \frac{1-F_b}{\alpha-F_b} > 1$, which is in fact equal to the ratio of the bond's loss given default ($LGD_{bond} = 100\%$) to the loan's loss given default ($LGD_{loan} = \frac{1-F_b-(1-\alpha)}{1-F_b}$):

$$\frac{y_b^*}{y_l^*} = \frac{LGD_{bond}}{LGD_{loan}}. \tag{14}$$



(I) Repayment of the senior debt (loan)



(II) Repayment of the junior debt (bond)

Figure 4: Repayment structures for mixed borrowing. Panel (I) illustrates the repayment of the senior debt (loan), and Panel (II) shows the repayment of the junior debt (bond). These diagrams depict how renegotiation affects the outcomes for both debt holders under solvent and distress states. I assume the face values of the loan and bond sum to 1, with the face value of bond denoted as F_b. There is an implicit assumption that the bond borrowing fraction is smaller than the bankruptcy cost, $F_b < \alpha$. This assumption ensures that the loan is not fully risk-free and implies a 100% expected loss rate on the junior debt (bond) in default.

Therefore, the difference between y_b^* and y_l^* arises solely from the seniority, implying that there is no other premium charged by the bank. One can also remove the seniority premium utilizing Equation 14.

Next, I consider the break-even condition for the loan and bond when there is a renegotiation. Since the total principal of debt is 1 and there are no dissenting bondholders, I assume the renegotiation cost is the same as in the pure bank borrowing scenario. I further assume that the cost is only incurred by the bank.[9] The corresponding yields for the loan and bond will satisfy:

$$1 - F_b = (1 - F_b)(1 - \rho_0)(1 + y) + \rho_0[(1 - \rho_1^L)(1 - F_b) + \rho_1^L(1 - \alpha) - C], \tag{15}$$

$$F_b = F_b(1 - \rho_0)(1 + y) + F_b\rho_0(1 - \rho_1^L). \tag{16}$$

Denote the solution as $y^*_{loan,mix}$ for the loan and $y^*_{bond,mix}$ for the bond:

$$y^*_{loan,mix} = \frac{(\alpha - F_b)\rho_0\rho_1^L + \rho_0 C}{(1 - F_b)(1 - \rho_0)}, \quad y^*_{bond,mix} = \frac{\rho_0\rho_1^L}{1 - \rho_0}. \tag{17}$$

Given the cost of loan and bond, the shareholder will determine whether to facilitate a renegotiation through paying a different rate. Using the same procedure to analyze the shareholder's cash flow, I show that the renegotiation is preferred when the cost C satisfies $C < \bar{C}$. The resulting $\bar{C}$ is the same as Equation 10 in the pure bank borrowing scenario (see proof in Appendix A.1).

Then, the variable of interest is the 'loan premium' as defined by Schwert (2020). In the empirical analysis, the loan premium is calculated as the yield spread of loan minus the yield spread of seniority-adjusted bond, i.e., the bond rate excluding the seniority premium. To align the model with the empirics, I define the seniority-adjusted bond rate as $y^*_{bond,adj}$, utilizing the

[9] This simplification is made because the bank typically takes the lead in restructuring negotiations due to its seniority and relationship with the borrower. Although bondholders may also incur renegotiation costs, such as opportunity costs or administrative expenses, I initially neglect these to simplify the analysis. Later, I account for bondholders' costs when considering the hold-out problem.

relation found in Equation 14:

$$y^*_{bond,adj} = y^*_{bond,mix}\frac{LGD_{loan}}{LGD_{bond}} = \frac{(\alpha - F_b)\rho_0\rho_1^L}{(1 - F_b)(1 - \rho_0)}. \tag{18}$$

The loan premium, denoted as π_L, is the difference between the loan rate and the seniority-adjusted bond rate:

$$\pi_L = y^*_{loan,mix} - y^*_{bond,adj} = \frac{\rho_0 C}{(1 - F_b)(1 - \rho_0)}. \tag{19}$$

Proposition 2. *In the mixed borrowing framework, where the firm borrows from both a relationship bank (senior debt) and the corporate bond market (junior debt), with the total face value summing to 1 and no hold-out problem (i.e., bondholders collectively agree with renegotiation), renegotiation is feasible when the bank offers a renegotiable loan rate that is attractive to shareholders.*

- ***Renegotiation feasibility:*** *The renegotiable loan rate is attractive if and only if the renegotiation cost C satisfies: $C < \bar{C}$.*
- ***Loan premium dynamics:*** *On the interval $C \in (0, \bar{C}\,]$, there is a loan premium π_L,*

$$\pi_L = \frac{\rho_0 C}{(1 - F_b)(1 - \rho_0)},$$

  and the premium increases in C and F_b.

The positive correlation between π_L and F_b is because the total compensation to the bank for the renegotiation remains unchanged while the face value of the loan decreases. It implies that the renegotiation guaranteed by the bank is on the whole debt position.

2.1.4 Mixed borrowing with hold-out problem

The previous section assumes that all bondholders are willing to accept the renegotiation, which provides them with an additional opportunity to recover the principal. Therefore, bondholders agree on a lower interest rate compared to without renegotiation. However, in practice, a hold-out problem may arise: a fraction of bondholders hold out of agreements and free-ride on others' concessions. As a result, the renegotiation plan may never be implemented by a pure bond-financing firm, due to inherent difficulties in achieving unanimous consent. The participation of banks can help mitigate the hold-out problem. As long as the bank lender and the majority of bondholders reach a consensus, restructuring can proceed. If the majority of debt holders have sufficient bargaining power, the hold-out bondholders might be 'forced' to accept the renegotiation. In a worst-case scenario, the hold-out bondholders could free-ride and receive full repayment at time 1. Nevertheless, the renegotiation can still be implemented by the majority of debt holders. However, bondholders would now face additional uncertainty about the outcome, knowing that the likelihood of a successful restructuring is reduced by the presence of hold-outs. Therefore, they demand compensation for the hold-out risk. I model this risk by assuming that a fraction h of the bonds' principal is effectively extorted by the hold-outs. This fraction reflects both the proportion of bondholders holding out and the extent of the hold-out's impact on recoveries. Now, the break-even condition for bondholders when considering renegotiation becomes:

$$F_b = F_b(1-\rho_0)(1+y) + F_b\rho_0(1-\rho_1^L) - F_b\rho_0 h. \tag{20}$$

Solving the equation and denoting the solution as $y^*_{bond,ho}$:

$$y^*_{bond,ho} = \frac{\rho_0\rho_1^L + \rho_0 h}{1-\rho_0}. \tag{21}$$

From previous analysis, it is not always optimal for shareholders to renegotiate when the cost of debt capital is too high. The hold-out problem can accelerate the shift to the no-renegotiation region because the total cost of debt increases.[10] I analyze the shareholder's payoff (in Appendix A.1) and show that renegotiation is only attractive when the renegotiation cost is below the threshold $\bar{C}_h$:

$$\bar{C}_h = \bar{C} - F_b h. \tag{22}$$

[10]In reality, the cost due to hold-out problem may also be encountered by the bank or shareholder, due to delays in restructuring, additional lawsuits, etc. Including these costs can further discourage the shareholder from choosing renegotiation.

To calculate the loan premium, I first derive the seniority-adjusted bond rate:

$$y^*_{bond,adj,ho} = y^*_{bond,ho}\frac{LGD_{loan}}{LGD_{bond}} = \frac{(\alpha - F_b)(\rho_0\rho_1^L + \rho_0 h)}{(1-F_b)(1-\rho_0)}. \tag{23}$$

The loan premium is the difference between $y^*_{loan,mix}$ and $y^*_{bond,adj,ho}$:

$$\pi_L^h = y^*_{loan,mix} - y^*_{bond,adj,ho} = \frac{\rho_0 C - (\alpha - F_b)\rho_0 h}{(1-F_b)(1-\rho_0)}. \tag{24}$$

Proposition 3. *In the mixed borrowing framework, where the firm borrows from both a relationship bank (senior debt) and the corporate bond market (junior debt), with the total face value of debts summing to 1 and considering the hold-out problem (a fraction h of the bonds' principal is extorted by hold-outs), renegotiation is feasible when the bank offers a renegotiable loan rate that is attractive to shareholders.*

- ***Renegotiation feasibility with hold-out problem:*** *The renegotiable loan rate is attractive if and only if the renegotiation cost C satisfies: $C < \bar{C}_h = \bar{C} - F_b h$.*
- ***Loan premium dynamics:*** *On the interval $C \in (0, \bar{C}_h\,]$, there is a loan premium π_L,*

$$\pi_L^h = \frac{\rho_0 C - (\alpha - F_b)\rho_0 h}{(1-F_b)(1-\rho_0)},$$

the premium increases in C and F_b, and decreases in h.

In the empirical analysis, I test the model implications utilizing an exogenous shock that increases the hold-out severity parameter h. In general, the model predicts that the loan premium will decrease as h increases. More importantly, it suggests that different types of firms experience different degrees of decreases. Specifically, when h becomes too large, renegotiation is halted by the shareholder because the cost threshold $\bar{C}_h$ is reached. For *bond-intensive* firms, the reduction in $\bar{C}_h$ is more substantial (see Equation 22). Therefore, the shock is more likely to push bond-intensive firms from the renegotiation region to the no-renegotiation region, causing the loan premium to fully disappear. For *non-bond-intensive* firms, the loan premium decreases with h but does not fully disappear because the renegotiation remains feasible. Overall, the model predicts that the shock will result in a larger decline in the loan premium for bond-intensive firms.

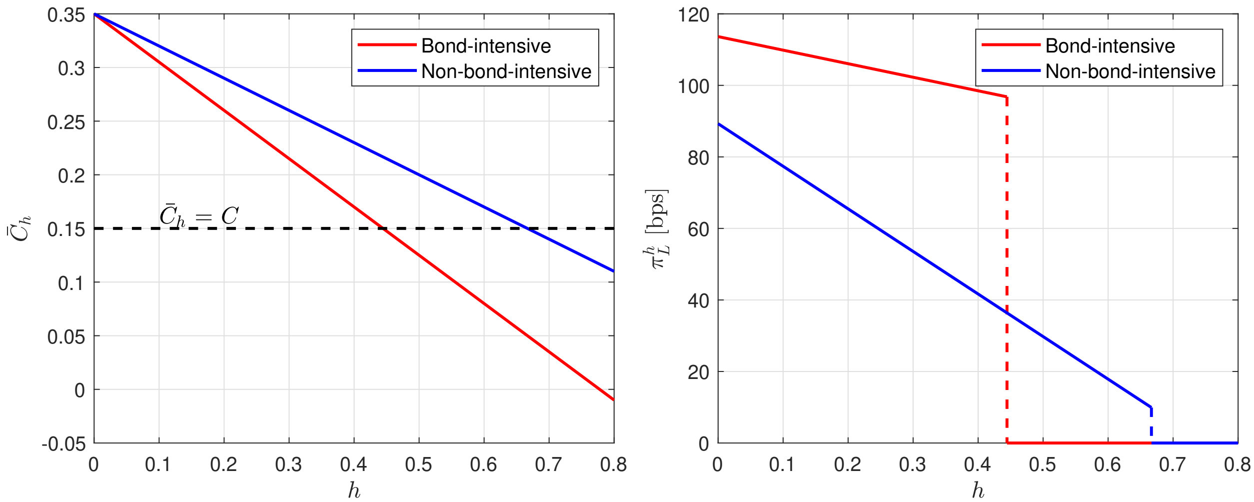


Figure 5: Calibration of cost threshold and loan premium. Left panel: Shows the cost threshold $\bar{C}_h$ as a function of hold-out severity h for bond-intensive firms ($F_b = 0.45$, red) and non-bond-intensive firms ($F_b = 0.3$, blue). The line $\bar{C}_h = C$ indicates the transition from renegotiation to no-renegotiation. Bond-intensive firms reach this threshold at lower h values. Right panel: Illustrates the loan premium π_L^h versus hold-out severity h for both firm types. For bond-intensive firms, the premium drops to zero around $h \approx 0.45$, while non-bond-intensive firms maintain a positive premium over a broader range of h.

Calibration I calibrate the model implications using parameters: $\rho_0 = 4\%, \alpha = 50\%, \rho_1^L = 50\%, V_2 = 1.2, C = 15\%$. I consider two types of firms: a bond-intensive firm with $F_b = 0.45$ and a non-bond-intensive firm with $F_b = 0.3$. Figure 5 illustrates the dynamics of the cost threshold $\bar{C}_h$ and the loan premium π_L^h as functions of the hold-out severity h. In the left panel, the red line represents the threshold $\bar{C}_h$ for the bond-intensive firm, while the blue line represents the non-bond-intensive firm. The intersections with the line $\bar{C}_h = C$ indicate the points at which the renegotiation cost equals the maximum acceptable renegotiation cost. When $\bar{C}_h$ falls below C, the firm shifts from the renegotiation region to the no-renegotiation region. Since the $\bar{C}_h$ of the bond-intensive firm decreases more rapidly with increasing h, it reaches the no-renegotiation region sooner. This is because the bond-intensive firm's maximum acceptable cost $\bar{C}_h$ is more sensitive to the hold-out severity h due to its higher F_b. The right panel shows the loan premium π_L^h for both firms as the hold-out severity h increases. For the bond-intensive firm, the loan premium shrinks to zero around $h \approx 0.45$, as it enters the no-renegotiation region. In contrast, the non-bond-intensive firm, with its higher $\bar{C}_h$, remains in the renegotiation region over a wider range of h values. Therefore, its loan premium remains positive until a higher level of hold-out severity is reached. To illustrate the model's predictions, consider a scenario where the hold-out severity h increases from 0.3 to 0.5. In this case, the loan premium for the bond-intensive firm falls by approximately 100 bps, effectively eliminating the premium as the firm moves into the no-renegotiation region. Meanwhile, the loan premium for the non-bond-intensive firm only decreases by about 20 bps, reflecting its continued presence within the renegotiation region.

2.2 The value of prepayment option

In addition to distressed renegotiation flexibility, bank loans offer prepayment options that allow firms to adjust their debt obligations in response to changes in their financial condition. Specifically, firms may prepay the loan or renegotiate interest rates when their creditworthiness improves (Roberts and Sufi, 2009; Roberts, 2015). This prepayment and repricing option provides firms with the ability to optimize their financing costs over time. However, this flexibility comes at a cost to banks, as it introduces uncertainty regarding future cash flows.

To quantify the compensation for the prepayment flexibility, I adapt the previous binomial tree framework into a two-period model. This setup captures how credit risk evolves over time and the strategic interactions between borrowers and lenders. The detailed mathematical formulation is provided in Appendix A.2, and the model has several key assumptions:

- **Credit risk evolution:** In each period, the firm's credit quality can either improve or deteriorate while it remains solvent. If the firm becomes insolvent, it will be liquidated.

- **Prepayment and repricing option:** In the first period, the firm may request a repricing of the interest rate for the second period. This is possible because the firm holds the bargaining power to terminate the existing loan contract and initiate a new one with more favorable terms.

- **Conditional repricing:** Repricing occurs only if the firm's credit quality has improved, allowing the firm to secure a lower interest rate for the subsequent period. Conversely, if the firm's credit quality deteriorates, it retains the original loan contract, which is preferable.

- **Prepayment risk compensation:** To account for the uncertainty and potential loss of future cash flows due to repricing, banks require compensation.

The key conclusions from the model indicate that the premium required to compensate banks for prepayment flexibility is relatively small. If this compensation is priced into the loan interest rate, it typically falls in the range of 20–30 bps. This is consistent with the finding by Schwert (2020) that calculates the prepayment risk as a Bermudan receiver swaption. However, Eckbo et al. (2022) argue from a theoretical perspective that, to avoid credit rationing, banks must be compensated for the prepayment risk with a minimum upfront fee, combined with a lower loan spread, rather than pricing it directly into the loan rate. Thus, whether prepayment risk is incorporated into the interest rate and contributes to the overall loan premium remains an empirical question.

My model implies that the prepayment risk premium should increase when there is a higher probability of the firm's credit quality improving, as well as when the expected credit improvement is larger. These predictions offer a basis for empirical testing, where observing a positive relationship between these factors and the loan premium would support the hypothesis that prepayment risk is priced into the interest rate.

3 Data

In this section, I describe the primary data sources and the sample creation for the empirical analysis. To reproduce the loan premium in Schwert (2020), I begin with loan originations from DealScan and merge them with bond quotes from Refinitiv Eikon. I use both reduced-form and structural models of credit risk to calculate the price difference between bank loans and corporate bonds. The required capital structure data is sourced from Compustat and S&P Capital IQ. The stock returns used to calculate market capitalization and equity volatility are obtained from CRSP.

Loan origination: I retrieve the loan origination data from DealScan, which contains historical information on loan pricing, contract details, and terms of syndicated loans. Before matching the loans with company information, I apply the following filters to loan issues: 1) The borrower country is the U.S. and the loan tranche currency is USD; 2) Exclude loans to financial firms (SIC 6000-6999) and quasi-public firms (SIC above 8999); 3) The loan type belongs to 'Term Loan', 'Revolver/Term Loan' or 'Revolver > 1Y'; 4) Exclude sponsored loans and those with the purpose of 'Commercial paper backup', 'Debtor-in-possession', 'Exit financing', 'Leveraged Buyout', 'Management Buyout', 'Sponsored Buyout'; 5) The loan seniority is senior; 6) The loan's margin interest rate is relative to LIBOR.

I use the linking table provided by Chava and Roberts (2008) to map the loan originations to the Compustat database. I also search for the loan issuers' permanent IDs (reported by DealScan) in Refinitiv Eikon and then obtain their CUSIPs to supplement the linking.

Firm characteristics: The firm characteristics are primarily obtained from Compustat and Capital IQ. From the Compustat quarterly table, I retrieve the book asset, total liability, book equity, total long-term debt, total revenue, operating income, and net property plant and equipment. To apply the structural model of credit risk, I also retrieve detailed capital structure information from Capital IQ, including total bank debt, outstanding balance for capital leases, and total undrawn credit.

Bond origination and bond price: From Mergent FISD, I collect the bonds issued by the firms in the loan dataset. After merging the bond issues with the loan originations, I apply the following filters: 1) The country domicile is the U.S. and the bond is denominated in USD; 2) The bond is not perpetual, and the maturity difference between the bond and loan does not exceed two years; 3) The bond is issued before the loan origination. Next, I search for the daily quotes of yield to maturity of the matched bonds in Refinitiv Eikon. I extract the daily quotes of matched bonds 10 calendar days before the corresponding loan is issued, and take the average of these quotes as the bond yield. Then, I merge the bond quotes back into the loan dataset. Finally, I compress the dataset by selecting only the matched bond with the closest maturity to the loan.

Bond holding: When testing the distressed renegotiation option, I obtain the firm's outstanding bond holdings at the time a loan is originated. I use the Mergent FISD database to collect all relevant bond information, but unlike previous filters, I do not restrict bond maturity. After matching the loan origination and bond issues, I apply only two filters: 1) The bond is denominated in USD and the country domicile is the U.S.; 2) The bond is issued before the loan origination. Once I find all matched bonds originated by the loan issuer, I identify whether each bond is still active with a non-zero outstanding amount. I search for each bond's status and the status effective date through Refinitiv Eikon. If a bond has matured or been called with an outstanding amount of zero, I drop it from the bond holding count. For matched bonds from the same issuer issued on the same date, I double-check whether these bonds share the same issue amount, coupon rate, and other characteristics. I drop the duplicated bonds as they are likely the same bonds issued under different rules or conditions, such as under the 144A rule or private placements.

Other data sources: I retrieve the LIBOR swap curve from Bloomberg to construct the maturity-matched risk-free rates. For a given date and rates, I apply cubic spline interpolation to extract the rate with the same maturity as the debt in question. I retrieve the daily stock price from CRSP to calculate the market capitalization. The daily stock return is also used to compute the equity volatility, the trailing stock return, and the subsequent stock return. Historical S&P long-term issuer ratings are collected from Capital IQ and Refinitiv Eikon and translated into numerical scores as shown in Appendix, Table A.I.

3.1 Sample creation

I compute the loan premium by subtracting the seniority-adjusted bond spread (bond-implied loan spread) from the actual loan spread. To measure the bond-implied loan spread, I first employ the reduced-form model of credit risk by Duffie and Singleton (1999). Following the data processing steps described above, I obtain a sample of loans matched with bond spreads from the same firm on the same date. The Duffie and Singleton (1999) model indicates that the yield spread should reflect the compensation for the expected loss given default of an instrument.[11] Assuming cross-default provisions are in place, the probability of default for

[11]In the model section, I also use this method to adjust for the seniority premium contained in the bond price.

bonds and loans issued by the same firm on the same date should be identical. Consequently, the model predicts that:

$$YS_{loan,implied} = \frac{LGD_{loan}}{LGD_{bond}} YS_{bond}, \tag{25}$$

where YS_{bond} is the yield spread of the matched bond and $YS_{loan,implied}$ denotes the bond-implied loan spread, or, the seniority-adjusted bond spread discussed in the model section. Schwert (2020) uses a loan-bond matched sample from 1997 to 2017 and finds that the expected loss given default of senior unsecured bonds is, on average, four times higher than that for loans. Therefore, the Duffie and Singleton (1999) model predicts that the bond-implied loan spread $YS_{loan,implied}$ is simply one-fourth of the bond spread, expressed as:

$$YS_{loan,implied} = \frac{1}{4} YS_{bond}. \tag{26}$$

In this paper, I extend the sample period to cover loan originations from 1997 to 2022. For the period after 2017, I assume the relative recovery rates for bonds and loans remain unchanged. This assumption might lead to inaccurate estimations of the bond-implied loan spread, particularly for the period after 2019. However, this should not affect subsequent estimations using the structural model.

I then compute the bond-implied loan spread by applying the recovery-adjusted Merton (1974) model, as illustrated in Schwert (2020). Assuming the firm's asset value follows a geometric Brownian motion,

$$d \ln V_t = \left(r - \frac{1}{2}\sigma^2\right) dt + \sigma dW_t^Q. \tag{27}$$

The firm has two classes of zero-coupon debt, the senior loan with face value K_S and the junior bond with face value K_J, both maturing at time T. Following Glover (2016), I assume a fraction α of the asset value is lost in the event of default, where α is proxied by $(0.45 - 0.2Lev_{book})$, with Lev_{book} denoting the book leverage. The value of the senior debt, denoted as D_S, is given by:

$$D_S = (1-\alpha)(1-\Phi(d_{1,S}))V + K_S e^{-rT}\Phi(d_{2,S}),$$
$$\text{with } d_{1,S} = \frac{\ln\left(\frac{V}{\min(K_S/(1-\alpha), K_S+K_J)}\right) + (r+\frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}}, \quad d_{2,S} = d_{1,S} - \sigma\sqrt{T}. \tag{28}$$

The value of the junior debt, denoted as D_J, is given by:

$$D_J = (1-\alpha)\left[V(\Phi(d_{1,S}) - \Phi(d_1)) - K_S e^{-rT}(\Phi(d_{2,S}) - \Phi(d_2))\right] + K_J e^{-rT}\Phi(d_2),$$
$$\text{with } d_1 = \frac{\ln(\frac{V}{K_S+K_J}) + (r+\frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}}, \quad d_2 = d_1 - \sigma\sqrt{T}. \tag{29}$$

The yields of senior and junior debt, denoted as y_S and y_J, are

$$y_S = \frac{1}{T}\ln\frac{K_S}{D_S}, \quad \text{and } y_J = \frac{1}{T}\ln\frac{K_J}{D_J}. \tag{30}$$

Given the model, the calculation procedure is as follows:

- First, find the junior debt price D_J given the yield of bonds y_J, using Equation 30.
- Then, insert the parameters K_S, K_J, V, T, r, D_J into Equation 29 and back out the asset volatility σ.
- Next, pass all the parameters to Equation 28 to get the price of the senior debt.
- Finally, compute the yield spread of the senior debt, which is the bond-implied loan spread.

I utilize detailed debt structure information from Capital IQ, where the senior debt amount K_S is defined as the sum of bank debt, capital lease, and undrawn credit. The amount of junior debt K_J is calculated as the total book debt less the senior debt. The detailed definitions and data sources for other related parameters are summarized in Table 1.

3.2 Summary statistics

Using the Merton model and the reduced-form model, I derive two series of bond-implied loan spreads. The variable of interest, the loan premium, is then computed as the actual loan

Table 1: Definitions and sources of parameters for computing the bond-implied loan spread using the structural model of credit risk.

Parameter	Description	Data	Source
K	Total book debt	Long-term debt plus current liabilities	Compustat
K_S	Senior debt amount	Bank, lease and undrawn debt	Capital IQ
K_J	Junior debt amount	Total book debt minus senior debt	Compustat
V	Quasi-market asset	Total book debt plus market equity	Compustat, CRSP
T	Maturity	Loan and bond maturities	DealScan, FISD
r	Risk-free rate	Maturity-matched LIBOR swap rate	Bloomberg
y_J	Junior debt yield	Daily quote of bond's yield	Refinitiv Eikon

spread less the bond-implied loan spread. The resulting loan premium and firm characteristics are summarized in Table 2. Detailed definitions of relevant variables can be found in Appendix Table A.II.

Panel (A) of Table 2 presents the summary statistics of the full sample, consisting of both term loans and credit lines over one year. On average, the loan spread over the LIBOR rate is around 195 bps, and the initial time to maturity of the loans is 4.4 years.[12] For the matched bond observations, the spread over the maturity-matched swap rate is close to 395 bps. Due to the maturity restriction, the average time to maturity of the bonds is 4.6 years. The average size of the bonds' face value is roughly half of the loan size, whereas the median sizes are comparable. Regarding firm characteristics, the median market asset is around \$6 billion, indicating a sample of relatively large firms. The typical issuer rating is $BB+$, between investment grade and non-investment grade. On average, the sample includes firms with a positive profitability of 2.8%. The statistics of the calculated loan premiums are presented at the bottom of Table 2. The median loan premium is close to 95 bps, indicating a significant spread between the private loan market and the public bond market.

Panel (B) of Table 2 presents the summary statistics when the sample is restricted to term loans only. The loan premium in the restricted sample ranges from 125 to 144 bps, aligning more closely with the results reported by Schwert (2020), who examines term loans exclusively.

[12] By definition, the all-in-drawn spread is calculated as the sum of the interest rate margin and various fees. However, as also documented by Berg et al. (2016), I find that the reported all-in-drawn spread is extremely close to the interest rate margin. Thus, in this paper, I treat the all-in-drawn spread as the rate that the borrower pays to all syndicate members in a loan contract.

Table 2: Summary statistics. This table documents the summary statistics on the full sample in Panel (A) and on the restricted sample of term loans only in Panel (B). The series of loan premiums are winsorized at the 0.1% level.

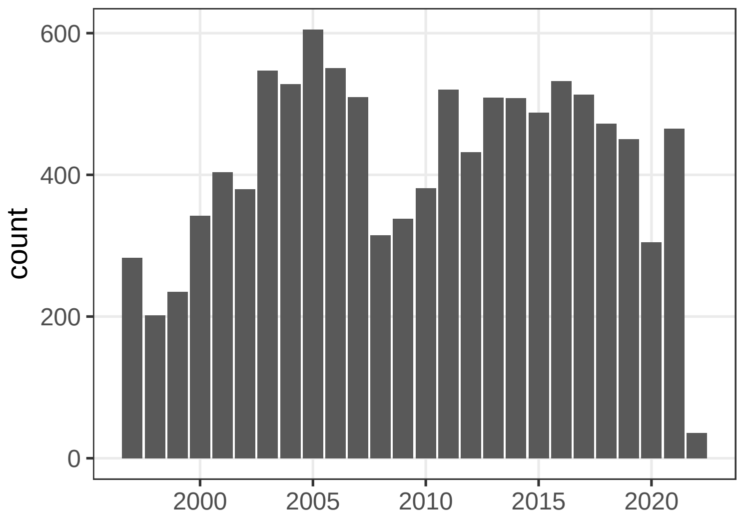
Panel A: Full sample

Variable	N	Mean	SD	Min	P25	Median	P75	Max
Loan characteristics								
All-in-drawn spread (bps)	10,851	195	124	5	112	175	250	1,200
Tranche amount ($M)	10,851	776	1,061	0	175	412	1,000	24,000
Maturity	10,851	4.4	1.4	1	3.4	5	5	12
Term loan	10,851	0.28	0.45	0	0	0	1	1
Secured loan	10,851	0.49	0.5	0	0	0	1	1
Lead arranger count	10,851	3.2	3	0	1	2	4	29
Performance pricing	10,851	0.29	0.46	0	0	0	1	1
Maturity matched rf (%)	10,851	3	1.9	0.15	1.5	2.3	4.6	7.6
Bond characteristics								
Yield to maturity (%)	10,851	6.9	5.8	0.1	3.5	5.7	8.1	50
Yield spread (bps)	10,851	395	554	-558	92	233	481	4,841
Face value ($M)	10,851	404	384	0.001	183	300	500	6,000
Maturity	10,851	4.6	1.6	0.0082	3.6	4.6	5.5	13
Maturity matched rf (%)	10,851	3	1.9	0.18	1.4	2.4	4.6	7.6
Firm characteristics								
Market asset ($B)	8,582	20	52	0.064	2.1	6	17	1,350
Market leverage (%)	8,582	42	22	0	23	39	57	98
Asset volatility	8,440	0.22	0.12	0.013	0.14	0.2	0.27	1.4
Distance to default	8,437	4.7	11	-398	3	5	7.3	54
Trailing stock return (%)	8,482	20	190	-96	-20	6.7	30	11,730
Asset market to book (%)	8,582	124	86	9.5	78	100	139	1,269
Asset tangibility (%)	10,572	40	26	0	15	36	62	98
Profitability (%)	10,341	2.9	2.9	-51	1.8	2.8	4	36
Bond to book asset (%)	10,680	32	29	0.26	16	26	39	621
S&P rating score	8,043	11	3.3	1	9	12	14	25
Loan premium								
Reduced form (bps)	10,851	96	128	-827	50	95	153	662
Structural form (bps)	4,292	57	283	-2,742	13	97	174	2,272

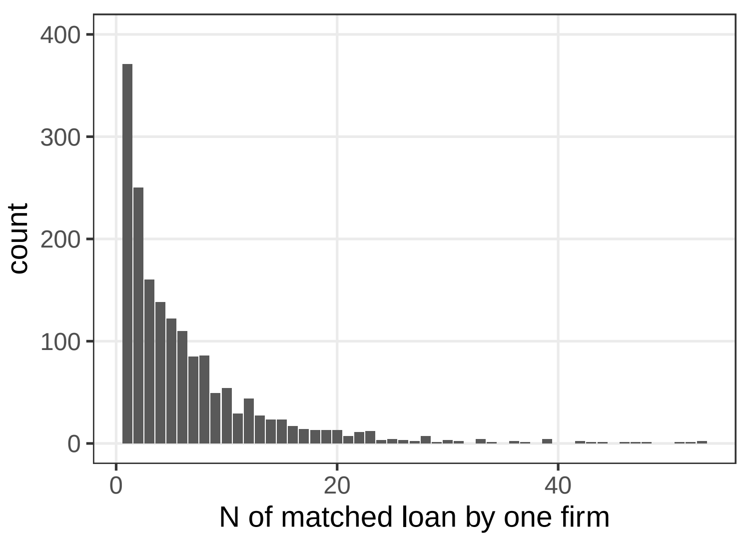
Table 2 - Continued

Panel B: Term loan only

Variable	N	Mean	SD	Min	P25	Median	P75	Max
Loan characteristics								
All-in-drawn spread (bps)	3,073	268	149	5	175	250	325	1,200
Tranche amount ($M)	3,073	536	645	0	135	300	675	5,000
Maturity	3,073	4.8	1.7	1	3.7	5	6	12
Term loan	3,073	1	0	1	1	1	1	1
Secured loan	3,073	0.72	0.45	0	0	1	1	1
Lead arranger count	3,073	3	2.9	0	1	2	4	19
Performance pricing	3,073	0.17	0.38	0	0	0	0	1
Maturity matched rf (%)	3,073	3.2	1.9	0.18	1.6	2.7	4.9	7.6
Bond characteristics								
Yield to maturity (%)	3,073	8.2	6.4	0.13	4.7	6.7	9.5	50
Yield spread (bps)	3,073	503	609	-558	186	334	571	4,805
Face value ($M)	3,073	434	381	0.001	200	329	500	4,800
Maturity	3,073	5	1.9	0.0082	3.8	5.1	6.3	13
Maturity matched rf (%)	3,073	3.2	1.9	0.18	1.5	2.7	4.9	7.6
Firm characteristics								
Market asset ($B)	2,376	14	48	0.064	2	5.2	13	722
Market leverage (%)	2,376	50	22	0.23	33	48	67	98
Asset volatility	2,309	0.21	0.12	0.013	0.13	0.18	0.26	1.4
Distance to default	2,308	3.4	15	-398	2.4	4.3	6.4	54
Trailing stock return (%)	2,325	22	151	-96	-25	4.3	33	3,701
Asset market to book (%)	2,376	120	87	9.5	78	99	133	1,072
Asset tangibility (%)	2,966	37	25	0	14	35	56	97
Profitability (%)	2,894	2.8	2.9	-50	1.7	2.8	3.9	29
Bond to book asset (%)	2,990	36	32	0.26	17	27	44	524
S&P rating score	2,271	13	2.9	3	12	13	14	25
Loan premium								
Reduced form (bps)	3,073	143	144	-765	84	144	207	662
Structural form (bps)	1,544	92	306	-2,742	40	125	207	2,272



(a) Loan issuance



(b) Loan issuance among issuers

Figure 6: Sample distribution. Panel (a) shows the distribution of the loan issuance over time in the final sample. The loan issuance is evenly distributed in most years, but there are sharp decreases during market downturns in 2008, 2020, and 2022. Panel (b) shows the distribution of the loan issuance among issuers in the final sample. It depicts how often each borrower appears in the final sample. For example, the first bar indicates that approximately 370 borrowers have only one loan origination with matched bond quotes in the final sample.

Both the all-in-drawn spread and the matched bond's spread are larger in the restricted sample compared to the full sample. However, the firm characteristics remain roughly unchanged.

I also present the histogram of loan originations in Figure 6, where Panel (a) provides an overview of the sample distribution over time. The loan issuance is relatively evenly distributed across most years, but there are sharp declines during market downturns, particularly in 2008, 2020, and 2022. Panel (b) illustrates the frequency of each borrower's appearance in the final sample. For example, the first bar indicates that approximately 370 borrowers have only one loan origination with matched bond quotes in the final sample.

4 Testing the distressed renegotiation

This section empirically tests the hypothesis developed in the model that banks charge a loan premium for providing renegotiation flexibility during financial distress. According to the model, this premium should decrease when renegotiation becomes less feasible. To assess this, I use the Marblegate ruling as a natural experiment. The subsequent subsections describe this ruling and the empirical strategy for testing its impact on the loan premium.

4.1 Institutional background of Marblegate

The TIA of 1939 was enacted to provide protections to holders of debt securities, with Section 316(b) stating:

> *"the right of any holder of any indenture security to receive payment of the principal of and interest on such indenture security, on or after the respective due dates expressed in such indenture security, or to institute suit for the enforcement of any such payment on or after such respective dates, shall not be impaired or affected without the consent of such holder..."*

In 2014, the for-profit education company Education Management Corp. ("EDMC") restructured approximately $1.3 billion in secured debt and $217 million in unsecured notes issued by EDMC's subsidiaries, through an out-of-court exchange offer. Under the restructuring, secured creditors foreclosed on their collateral and that allowed EDMC to transfer those assets to a newly formed subsidiary of EDMC. In addition, the release of the guaranty by secured creditors caused a release of EDMC's guaranty of the unsecured notes under qualified terms of the TIA. Although the transaction did not amend the unsecured notes' payment terms (or the indenture at all), dissenting noteholders were left only claims against the old EDMC subsidiaries, which at that point had no assets. Consequently, unsecured creditors who declined to participate in the exchange offer would not receive any payment on their notes.

As a result, two hold-out noteholders (collectively "Marblegate"), with a par value of around $14 million in unsecured notes, sued against the exchange offer in October 2014. Marblegate alleged that the transaction violated Section 316(b) by effectively depriving them of the practical ability to collect on the notes and that the offer was overly coercive. In December 2014, the court denied Marblegate's motion for an injunction of the exchange offer because they failed to demonstrate a likelihood of irreparable harm and because the balance of the equities and the public interest weighed against granting the injunction. However, the district court ruled that Marblegate was likely to succeed on the merits of its TIA claim. In the end, EDMC proceeded with the exchange offer, but as a consequence of the ruling, EDMC altered certain terms to protect Marblegate's rights, including the removal of the parent guaranty cancellation.

The largest impact of the ruling stems from the court's reinterpretation of the TIA as offering "broad protection against nonconsensual debt restructurings". The court rejected the view that the TIA offers only a "narrow protection against majority amendment of certain core terms." If this view is adopted by other courts, it may become more difficult to implement an out-of-court restructuring without unanimous consent, even if the actions taken are permitted by the indenture. This reinterpretation significantly disrupted the long-held assumptions regarding out-of-court restructurings. There was also concern that giving minority noteholders more leverage to block a restructuring could result in more bankruptcy filings and increase bankruptcy costs as more litigation ensues.

The overturn of Marblegate in 2017: The defendants filed for a review in the Second Circuit Court of Appeals, where the appeals court largely overturned Marblegate. The Second Circuit found the meaning of Section 316(b) ambiguous and resorted to the legislative history to determine its meaning. In January 2017, the Second Circuit decision restored the law to its pre-Marblegate interpretation. Among other things, the decision provided bond issuers with comfort that they could again seek to implement exchange offers through the use of exit consents without the uncertainty of violating Section 316(b).

4.2 Empirical strategy and test results

The ultimate goal is to identify whether the loan premium is paid to banks for providing renegotiation flexibility during financial distress. To test this, I employ a difference-in-difference analysis leveraging the Marblegate ruling. The case has attracted widespread attention in financial markets and led to greater uncertainty for distressed firms when seeking out-of-court restructurings. I view this shock as a force pushing some firms from the renegotiation region to the no-renegotiation region, as illustrated in Figure 3. Specifically, my model predicts that bond-intensive firms would face increased difficulty in out-of-court restructuring after the Marblegate ruling, due to the exacerbated hold-out problem. This prediction is empirically supported by Kornejew (2024), who documents that bond-intensive firms experienced a significant increase in the tendency to file for bankruptcy after the shock. Furthermore, as suggested by the theoretical discussion, if it becomes unlikely to achieve an out-of-court restructuring, the loan premium associated with renegotiation will disappear. Therefore, bond-intensive firms should experience a larger decrease in loan premium following the shock.

A standard difference-in-difference regression compares treated and non-treated groups before and after a shock. However, the Marblegate ruling was reversed in 2017. The impact of this reversal may be limited because it was not entirely unexpected, and market participants were already cautious about potential policy shifts. To maintain a clean difference-in-difference comparison, I first limit the analysis to the sample period before 2017 (referred to as the *restricted sample*) and run the following regression:

$$\text{Loan premium}_{i,t} = \beta_1 M_t + \beta_2 B_{i,t} + \beta_3 (M_t \times B_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + e_{i,t}, \tag{31}$$

where the binary indicator M_t equals one if the loan is originated in 2015 or 2016, $M_t = \mathbb{1}(\text{year} =$

2015, 2016). The variable $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the median bond holding of the entire sample. The median level of the bond holding intensity, defined as the outstanding bond face value scaled by the book asset value, is 0.26. This is very close to the median bond holding intensity of 0.25 as documented in Kornejew (2024). I then define the bond-intensive indicator as $B_{i,t} = \mathbb{1}(\text{bond holding}_{i,t}/\text{book asset}_{i,t} > 0.26)$. The key variable of interest is the interaction between the bond-intensive indicator and the Marblegate indicator ($M_t \times B_{i,t}$), and the coefficient $\hat{\beta}_3$ can capture the impact of the Marblegate ruling on bond-intensive firms after the shock. The specification in Equation 31 also includes the industry fixed effect, as captured by τ_s. I do not include the firm fixed effect since it would largely remove the statistical power: firms with only one loan observation would be dropped, and firms with only a few loan observations would offer very limited within-firm variation (see Figure 6 for the sample distribution). Nevertheless, I include a set of firm-level control variables: market leverage, asset volatility, trailing stock return, asset market-to-book ratio, asset tangibility, and profitability, which are collectively denoted by $\boldsymbol{x}_{i,t}$. I cluster the standard errors at the firm and year levels. The first four columns in Table 3 summarize the test results.

The coefficients of the interaction term are negative and significant across different specifications, confirming the hypothesis that the loan premium decreases for bond-intensive firms after the shock, due to a lower chance of implementing out-of-court procedures. The magnitude is economically sizable: the Marblegate ruling led to a decrease in the loan premium by 18–28 bps for the reduced model specification, and by 83–107 bps for the structural model specification. In addition, the coefficient for the indicator $B_{i,t}$ is positive and significant. This indicates that before the shock (when renegotiation was more feasible), bond-intensive firms had a larger loan premium, consistent with model predictions. However, the coefficient for M_t is positive but not statistically significant, which contradicts the model's prediction that the loan premium should decrease as h (the hold-out severity) increases. One plausible explanation is that I assumed the bank lender requires only a fixed renegotiation compensation, C, which is independent of h. In practice, however, the hold-out problem may also increase the bank's costs. Consequently, both the bank and bondholders might require compensation for hold-out risk. This can result in a relatively flat (or even increasing) loan premium as h increases.

Table 3: This table reports the response of loan premium to the Marblegate ruling, the sample is restricted to before and including the year 2016. The regression formula for the first four columns is Loan premium$_{i,t} = \beta_1 M_t + \beta_2 B_{i,t} + \beta_3 (M_t \times B_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + e_{i,t}$. In the last two columns, the year fixed effects are included while the event indicator M_t is excluded. The dependent variable, loan premium (bps), is the seniority-adjusted difference between the loan spread and bond spread for the same firm on the same date. The binary indicator M_t equals one if the loan is originated in 2015 or 2016, after the Marblegate ruling took effect. $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the sample median of 0.26. The variable of interest is the interaction $M_t \times B_{i,t}$. Industry fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year levels.

	Dependent variable:					
	Loan premium (reduced)	Loan premium (structural)	Loan premium (reduced)	Loan premium (structural)	Loan premium (reduced)	Loan premium (structural)
	(1)	(2)	(3)	(4)	(5)	(6)
Marblegate	13.999*	15.773	21.268***	36.318		
	(7.599)	(26.550)	(7.617)	(25.452)		
Bond intensive	8.785	60.149***	20.902***	104.523***	15.730***	91.469***
	(5.938)	(11.939)	(3.894)	(14.252)	(4.349)	(15.917)
Marblegate*Bond intensive	-18.224^{**}	-83.243^{***}	-27.656^{**}	-107.314^{***}	-26.378^{*}	-94.086^{***}
	(8.384)	(22.174)	(14.022)	(24.458)	(13.823)	(25.294)
Covariates	No	No	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes
Observations	8,607	3,202	6,352	3,010	6,352	3,010
R^2	0.050	0.078	0.092	0.129	0.143	0.157
Adjusted R^2	0.043	0.061	0.082	0.110	0.131	0.134
Note:						*p<0.1; **p<0.05; ***p<0.01

I then run the same regression on the *restricted sample*, but further include year fixed effects (denoted as θ_t) while excluding the Marblegate indicator due to multicollinearity:

$$\text{Loan premium}_{i,t} = \beta_2 B_{i,t} + \beta_3(M_t \times B_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + \theta_t + e_{i,t}. \tag{32}$$

The results are summarized in the last two columns in Table 3. The estimation of $\hat{\beta}_3$ remains negative and significant. The size of the Marblegate effect is very close to the previous finding, indicating a robust and economically large effect.

4.3 Differential impact of institutional characteristics

I conduct triple difference-in-difference tests to identify which types of loans have the strongest treatment effect. As documented by Demiroglu and James (2015), loans from transitional bank lenders are significantly easier to restructure out of court than those from institutional lenders. Motivated by this, I test if the Marblegate effect is centered around loans that are not held in part by collateralized loan obligations (CLOs). Although it is not possible to directly observe whether a loan is held by CLOs in DealScan, the database reports an identifier (LIN code) if the loan is traded in the secondary market. I proxy the CLO holding status by whether a loan is associated with a LIN code and denote this indicator variable as $LIN_{i,t} = \mathbb{1}(LIN \text{ available})$. The regression is specified as:

$$\text{Loan premium}_{i,t} = \beta_3(M_t \times B_{i,t}) + \delta(M_t \times B_{i,t} \times LIN_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \boldsymbol{z}_{i,t}\boldsymbol{\phi} + \tau_s + e_{i,t}. \tag{33}$$

The triple interaction term captures whether the LIN-available loans respond differently from LIN-unavailable loans after Marblegate. The term $\boldsymbol{z}_{i,t}$ includes all the regressors generated by the triple interaction, which are $M_t, B_{i,t}, LIN_{i,t}, M_t \times LIN_{i,t}, B_{i,t} \times LIN_{i,t}$. Table 4 reports the test results (on the *restricted sample*).

Across all specifications, I find that the coefficients for the initial interaction $M_t \times B_{i,t}$ remain negative, while the coefficients for the triple interaction $M_t \times B_{i,t} \times LIN_{i,t}$ are all positive. This positive sign indicates that the Marblegate effect on loan premium is less negative for

Table 4: This table reports the response of loan premium to the Marblegate ruling for different types of loans. The sample is restricted to before and including the year 2016. The regression formula is Loan premium$_{i,t} = \beta_3(M_t \times B_{i,t}) + \delta(M_t \times B_{i,t} \times LIN_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \boldsymbol{z}_{i,t}\boldsymbol{\phi} + \tau_s + e_{i,t}$. The dependent variable, loan premium (bps), is the seniority-adjusted difference between the loan spread and bond spread for the same firm on the same date. The binary indicator M_t equals one if the loan is originated in 2015 or 2016, $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the sample median of 0.26, $LIN_{i,t}$ is an indicator that equals one if the loan is associated with a secondary market identifier (a proxy for CLO association). The variable of interest is the triple interaction $M_t \times B_{i,t} \times LIN_{i,t}$; the coefficients of other interactions $\boldsymbol{z}_{i,t}$ are omitted in the table. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year levels.

	Dependent variable:			
	Loan premium (reduced)	Loan premium (structural)	Loan premium (reduced)	Loan premium (structural)
	(1)	(2)	(3)	(4)
Marblegate*Bond intensive	-19.711^{***}	-129.152^{***}	-33.148^{**}	-162.531^{***}
	(6.585)	(13.284)	(14.769)	(18.067)
Marblegate*Bond intensive*LIN indicator	12.819	109.716^{**}	20.824	137.399^{***}
	(15.608)	(47.588)	(18.024)	(41.988)
Covariates	No	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	No	No	No	No
Observations	8,607	3,202	6,352	3,010
R^2	0.059	0.079	0.101	0.130
Adjusted R^2	0.052	0.061	0.091	0.110
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 5: This table reports the response of loan premium to the Marblegate ruling, for different types of loans. The sample is restricted to before and including the year 2016. The regression formula is Loan premium$_{i,t} = \beta_3(M_t \times B_{i,t}) + \delta(M_t \times B_{i,t} \times OneLead_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \boldsymbol{z}_{i,t}\boldsymbol{\phi} + \tau_s + e_{i,t}$. The dependent variable, loan premium (bps), is the seniority-adjusted difference between the loan spread and bond spread for the same firm on the same date. The binary indicator M_t equals one if the loan is originated in 2015 or 2016, $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the sample median of 0.26, $OneLead_{i,t}$ is an indicator that equals one if the loan has only one lead arranger. The variable of interest is the triple interaction $M_t \times B_{i,t} \times OneLead_{i,t}$, the coefficients of other interactions $\boldsymbol{z}_{i,t}$ are omitted in the table. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year levels.

	Dependent variable:			
	Loan premium (reduced)	Loan premium (structural)	Loan premium (reduced)	Loan premium (structural)
	(1)	(2)	(3)	(4)
Marblegate*Bond intensive	-20.560^{*}	-51.870^{*}	-27.208^{*}	-66.972^{*}
	(11.480)	(31.066)	(15.230)	(34.351)
Marblegate*Bond intensive*One lead indicator	-16.963	-181.077^{***}	-33.414^{**}	-205.989^{***}
	(18.284)	(62.502)	(13.261)	(67.420)
Covariates	No	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	No	No	No	No
Observations	8,574	3,201	6,330	3,009
R^2	0.054	0.079	0.095	0.131
Adjusted R^2	0.046	0.061	0.085	0.112
Note:				*p<0.1; **p<0.05; ***p<0.01

CLO-associated loans than for non-CLO-associated loans. In other words, while bond-intensive firms generally see a decrease in loan premium after the shock, this decrease is smaller for CLO-associated loans. This finding supports the hypothesis that loans associated with institutional lenders are harder to renegotiate, resulting in a smaller Marblegate effect. Notably, the positive coefficient of the triple interaction term can almost cancel out the negative Marblegate effect. It indicates that before the shock, CLO-associated loans were already located in the no-renegotiation region as plotted in Figure 3, so there is a merely small response to the shock.

Apart from the CLO association, the number of lenders can also affect the cost of distressed renegotiation. Therefore, it is interesting to examine whether the treatment effect is different for loans with only one lender or loans with multiple lenders. I hypothesize that loans with only one lender incur lower renegotiation costs, so they are more likely to renegotiate. These loans should therefore be more affected by the ruling shock, which suddenly pushes them from the renegotiation region to the non-renegotiation region.

To test this, I divide the sample based on the number of lead arrangers because in the syndicated loan universe, most of the loans are not bilateral. The median number of lenders in the final sample is nine, and only a small fraction of loans are lent by a single bank. So instead of utilizing the count of lenders, I use the count of lead arrangers which still captures the idea that fewer lead arrangers in a syndicate can better facilitate a renegotiation due to lower renegotiation costs. I denote loans with only one lead arranger by the indicator: $OneLead_{i,t} = \mathbb{1}(\text{Number of lead arranger} = 1)$, and test,

$$\text{Loan premium}_{i,t} = \beta_3(M_t \times B_{i,t}) + \delta(M_t \times B_{i,t} \times OneLead_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \boldsymbol{z}_{i,t}\boldsymbol{\phi} + \tau_s + e_{i,t}. \quad (34)$$

The test results (on the *restricted sample*) are summarized in Table 5. The coefficient of $M_t \times B_{i,t}$ remains negative, although the magnitude decreases substantially. Take column (2) as an example, the coefficient of -52 indicates that for multiple-arranger loans, bond-intensive firms experience a larger decrease in loan premiums by 52 bps after the event compared to non-bond-intensive firms. The coefficient of the triple interaction $M_t \times B_{i,t} \times OneLead_{i,t}$ is -181, representing the additional differential effect of the event on loan premiums for bond-intensive firms with one arranger compared to those with multiple arrangers. This means that the overall decrease in loan premium for bond-intensive firms with one lender is significantly larger, highlighting that loans with only one arranger are indeed more affected. The result supports the hypothesis that the shock decreases the loan premium due to reduced renegotiation possibilities.

To summarize, the triple difference-in-difference tests provide more insights into the heterogeneity of the treatment effects across different loan types. The results further validate the mechanism that the negative Marblegate effect is associated with the ease (or the cost) of renegotiation. Specifically, loans associated with CLOs are less affected by the ruling, indicating that institutional lenders are less flexible in renegotiations. Additionally, loans with only one lead arranger exhibit a larger decrease in loan premium post-Marblegate, highlighting the ease of renegotiation with fewer lenders involved.

4.4 Long-term effect of Marblegate

The results so far have shown only the effect of the initial ruling shock in 2014 based on the *restricted sample* before the overturn in 2017. It is also interesting to examine the long-term effect of the ruling, especially because the ruling has drawn widespread attention and eventually got overturned. To explore this, I conduct a dynamic difference-in-difference regression to allow for a visual examination of the impacts of Marblegate. First, I generate a centered time variable for the year 2014 ($T = 0$), which is the last period before Marblegate. Thus, the first period after the Marblegate implementation is 2015 ($T = 1$), the second-to-last period before Marblegate is 2013 ($T = -1$), and so on. I then interact the treatment variable ($B_{i,t}$) with a set of binary indicator variables $\mathbb{1}_{\pm T}$ for each of the time periods:

$$\text{Loan premium}_{i,t} = \beta_2 B_{i,t} + (\mathbb{1}_{\pm T} \times B_{i,t})\boldsymbol{\delta}_{\pm T} + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + \theta_t + e_{i,t}. \tag{35}$$

The resulting coefficients of $\boldsymbol{\delta}_{\pm T}$ are plotted in Figure 7. The effects are near zero (relative to the year 2014) in most pre-treatment periods, suggesting a parallel trend before the shock. There is, however, a significant drop in 2015 and 2016, indicating a reduction in the loan premium for bond-intensive firms following the shock. The coefficient of 2017 is also significantly negative, indicating the Marblegate effect did not immediately dissipate after the overturn, but began fading away from 2018. Overall, the test results support the hypothesis that the loan premium charged by banks is driven by the flexibility to renegotiate during financial distress, and the observed parallel trend in pre-treatment periods strengthens the validity of these findings.

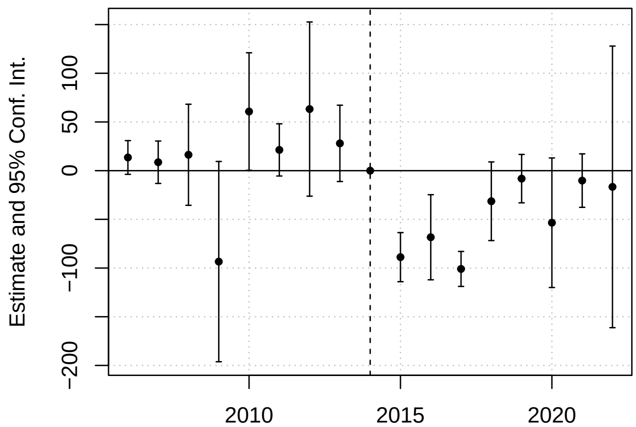


Figure 7: This figure shows the long-term effect of Marblegate on the loan premium through a dynamic difference-in-difference analysis. I estimate Loan premium$_{i,t}$ $= \beta_2 B_{i,t} + (\mathbb{1}_{\pm T} \times B_{i,t})\boldsymbol{\delta}_{\pm T} + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + \theta_t + e_{i,t}$, where the loan premium (in bps) is as measured by the structural model. The variable $B_{i,t}$ is an indicator that equals one if the issuer firm's bond holding is above the median bond holding of the entire sample. I generate a centered time variable for the year 2014 ($T = 0$), which is the last period before Marblegate. Thus, the first period after the Marblegate implementation is 2015 ($T = 1$), the second-to-last period before Marblegate is 2013 ($T = -1$), and so on. Then, I interact $B_{i,t}$ with a set of binary indicators $\mathbb{1}_{\pm T}$. After running the regression, I plot the coefficients of the interaction terms.

4.5 Robustness tests

To validate the main result, I conduct a series of robustness tests. First, I conduct the same regression as specified in Equation 31, but use the full-period sample including observations after 2016. The definition of the indicator variable M_t remains unchanged, it equals one if the loan is originated in 2015 or 2016. For observations before 2015 or after 2016, the indicator M_t is zero. The regression results are presented in Appendix Table A.III. Compared to the results on the *restricted sample*, the Marblegate effect decreases only slightly.

Second, I examine whether the drop in the loan premium originates from a decrease in the loan spread or an increase in the bond spread. I run the following regression on the *restricted sample*,

$$\text{Loan/Bond spread}_{i,t} = \beta_1 M_t + \beta_2 B_{i,t} + \beta_3 (M_t \times B_{i,t}) + \tau_s + e_{i,t}. \tag{36}$$

The results are presented in Appendix Table A.IV. Column (1) reports the regression where the dependent variable is the loan spread, the coefficient $\hat{\beta}_3$ of the interaction term is significantly negative. Column (2) reports the regression where the dependent variable is the seniority-adjusted bond spread. The coefficient $\hat{\beta}_3$ of the interaction term is not significantly different from zero. Since it is available to observe the time-series data of bond prices, I re-run the second regression of bond spreads on the Marblegate and bond-intensive indicators. The monthly observations of bond spreads and returns are collected from the Trace database. The results are summarized in Table A.V. Once again, I find that the response of bond spread to the Marblegate shock is insignificant. So, these results suggest that the reduction in the loan premium mainly arises from a reduction in the loan side.

Third, when I further restrict the sample to term loans only, and conduct the regression as specified in Equation 31, using observations before 2017. The conclusion still holds, see Table A.VI in the Appendix.

5 Testing the prepayment option

In this section, I examine whether the loan premium partially arises from the prepayment and repricing flexibility. The theoretical analysis implies that the prepayment risk premium should increase when there is a higher probability of the firm's credit quality improving, as well as when the expected credit improvement is larger. However, it is challenging to obtain precise measures of either the probability of credit quality improvement or the magnitude of the expected improvement. Therefore, directly regressing the loan premium on these expectations is not feasible. To address this, I conduct two reverse regressions. First, I test whether the loan premium can predict a future credit improvements. Second, I test whether a higher loan premium can predict a larger credit improvement. The first test is specified by,

$$\text{I(Rating improves)} = \beta_1 \text{Loan premium}_{i,t} + \beta_2 \text{Initial rating}_{i,t} + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + \theta_t + e_{i,t}. \quad (37)$$

The dependent variable is an indicator that equals to one if the issuer's rating improves within five years after the loan origination. If the rating remains unchanged or is downgraded, the variable is zero.[13] The unconditional mean of the rating improvement indicator is roughly 30%. The key explanatory variable is the loan premium (in percentage points). The theoretical analysis suggests that if the prepayment compensation is part of the loan premium, a higher premium should predict future credit quality improvement. Thus, I expect the estimated coefficient of the loan premium $\hat{\beta}_1$ to be positive. The specification in Equation 37 also includes industry and year fixed effects, represented by τ_s and θ_t. Given that it is generally easier for low-credit firms to have rating improvements and it is not possible for highest-credit firms to improve, I incorporate the firm's credit rating before the loan issuance as a control variable. In the largest model specification, I also include the same set of firm-level control variables as in the renegotiation test, denoted by $\boldsymbol{x}_{i,t}$. Standard errors are clustered at the firm and year levels.

The test results are summarized in Table 6. The coefficients of the loan premium are significantly positive across different specifications, indicating a positive association between the loan premium and future credit improvement. In terms of economic significance, the coefficient in column (1) is 0.022, suggesting that a one-percentage-point increase in the loan premium predicts a 2.2% higher probability of credit improvement. Given that the unconditional mean of credit improvement is 0.3, this result translates to a 7.3% increase in the likelihood of credit improvement. Columns (3) and (4) report the regressions with additional control variables to account for other factors that may affect future rating changes. Although the magnitude of the predictive power decreases, the conclusion that the loan premium is positively associated with

[13] To determine whether the rating is upgraded, downgraded, or unchanged, I proceed as follows. First, I find the current credit rating of a firm when the loan is originated. Then, I identify the next assigned rating by S&P of the firm after the loan origination. If the assigned time exceeds five years after loan origination, I treat the rating as unchanged. Otherwise, if the assigned time is within five years, I take the newly assigned rating (which can be upgraded, downgraded, or unchanged).

Table 6: This table reports the regression of the indicator of issuer's rating improvement on the loan premium (pp). The estimation is specified by $\mathrm{I}_{i,t}(\text{Rating improves}) = \beta_1 \text{Loan premium}_{i,t} + \beta_2 \text{Initial rating}_{i,t} + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + \theta_t + e_{i,t}$. The dependent variable is a binary indicator that equals to one if the loan issuer's rating is upgraded within five years after the loan origination. The key variable of interest is the loan premium, calculated as the seniority-adjusted difference between the loan spread and bond spread for the same firm on the same date. The control variables $\boldsymbol{x}_{i,t}$ are defined in the appendix. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year levels.

	Dependent variable:			
	I(Rating improves within 5 years)			
	(1)	(2)	(3)	(4)
Loan premium (reduced)	0.022***		0.014**	
	(0.006)		(0.006)	
Loan premium (structural)		0.010**		0.007*
		(0.004)		(0.003)
Initial rating	0.036***	0.039***	0.052***	0.062***
	(0.003)	(0.005)	(0.005)	(0.008)
Covariates	No	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	7,917	3,314	6,035	3,156
R^2	0.119	0.148	0.159	0.184
Adjusted R^2	0.110	0.127	0.147	0.161
Note:		*p<0.1; **p<0.05; ***p<0.01		

rating improvement remains robust.

Next, I replace the dependent variable with the actual change in the credit rating score within five years after the loan origination. The regression is specified as follows:

$$\text{Rating score change}_{i,t} = \beta_1 \text{Loan premium}_{i,t} + \beta_2 \text{Initial rating}_{i,t} + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + \theta_t + e_{i,t}. \quad (38)$$

As suggested by the model, if the firm's credit quality improves more, the prepayment option becomes more attractive. Thus, the compensation to the bank should be positively correlated with the extent of future credit quality improvement (or negatively correlated with the future credit risk). In Equation 38, the dependent variable is measured by the actual change in the rating score in the subsequent five years after the loan origination, where a negative number indicates a rating upgrade (see Table A.I). If a larger loan premium contains more compensation for the prepayment risk, it should predict a greater upgrade (more negative score change). Therefore, I expect $\hat{\beta}_1$ to be negative in this specification.

The test results are presented in Table 7. Across all specifications, the coefficients of the loan premium are negative, consistent with the expectation that the premium should be negatively correlated with future credit risk. The coefficient in column (1) indicates that a one-percentage-point increase in the loan premium predicts a future rating score decline of 0.08 (corresponding to an upgrade). Although the economic magnitude is small, this result aligns with the theoretical perspective that prepayment compensation accounts for only a small portion of the credit risk.

Table 7: This table reports the regression of the actual change of issuer's rating score on the loan premium (pp). The estimation is specified by Rating score change$_{i,t} = \beta_1$Loan premium$_{i,t} +$ β_2Initial rating$_{i,t} + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + \theta_t + e_{i,t}$. The dependent variable is the actual change of the loan issuer's rating within five years after the loan origination. The key variable of interest is the loan premium, calculated as the seniority-adjusted difference between the loan spread and bond spread for the same firm on the same date. The control variables $\boldsymbol{x}_{i,t}$ are defined in the appendix. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year levels.

	Dependent variable:			
	Rating (score) change within 5 years			
	(1)	(2)	(3)	(4)
Loan premium (reduced)	−0.082***		−0.060**	
	(0.027)		(0.024)	
Loan premium (structral)		−0.032**		−0.022**
		(0.012)		(0.011)
Initial rating	−0.060***	−0.052***	−0.108***	−0.107***
	(0.009)	(0.014)	(0.015)	(0.024)
Covariates	No	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	7,917	3,314	6,035	3,156
R^2	0.084	0.118	0.131	0.157
Adjusted R^2	0.074	0.096	0.118	0.133
Note:				*p<0.1; **p<0.05; ***p<0.01

5.1 Robustness tests

To further address the concern that rating improvement is more likely for high-yield credit, I conduct a robustness test. Instead of using the loan premium as a predictor of rating movement in Equation 38, I use the firm's 5-year CDS spread. The results, summarized in Table A.VII, show that after controlling for the initial credit rating, the CDS spread does not have predictive power for future rating changes. For comparison, I re-run the regression using the loan premium on the same sample as in the CDS test and find that the loan premium retains its predictive power.

6 Conclusion

This paper examines the source of a substantial interest rate premium charged by banks relative to the credit spread implied by the bond market. The central finding is that a significant portion of the loan premium arises from the valuable flexibilities offered by banks, beyond what the capital market can provide. Specifically, banks facilitate renegotiations during periods of financial distress, enabling firms to avoid bankruptcy costs, which in turn justifies their willingness to pay a premium. I arrive at this finding by using a difference-in-difference analysis based on a 2014 U.S. court ruling, which led to more concerns about hold-out risk and increased the difficulty of pursuing out-of-court restructurings. Additionally, I show that the prepayment risk is priced into the interest rate and accounts for a minor portion of the loan premium. These findings suggest that banks create value through their ability to renegotiate debt, explaining firms' willingness to borrow from banks despite the higher costs involved.

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Appendices

A.1 Proof: the distressed renegotiation option

Assume the repayment at time 2 includes principal and interest In the main analysis, I have assumed that after the restructuring, if the firm recovers at time 2, the bank will only receive the face value. This assumption is made to simplify derivations. Now I show that all key insights remain valid when I assume the bank receives both the full face value and interest. For the no-renegotiation scenario, the yield is the same as in Equation 1:

$$y^* = \frac{\alpha\rho_0}{1-\rho_0}.$$

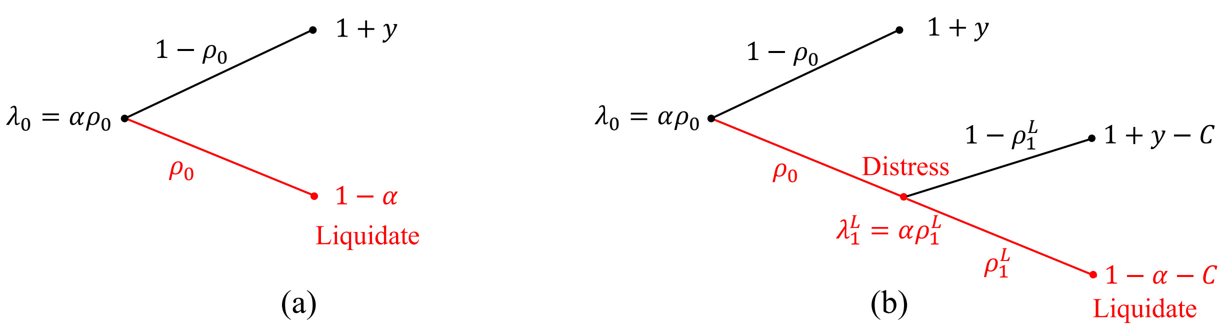


Figure A.1: The one-period debt (Panel (a)) and the debt with an extension in distress (Panel (b)). Here, I assume that at time 2, if the firm rehabilitates, the bank will receive both the principal and the interest.

When renegotiation leads to an extension and the bank recovers the full face plus interest, the pricing formula becomes:

$$1 = (1-\rho_0)(1+y) + \rho_0[\rho_1^L(1-\alpha) + (1-\rho_1^L)(1+y) - C],$$

and the yield is:

$$y^*_{loan} = \frac{\alpha\rho_0\rho_1^L + \rho_0 C}{1-\rho_0\rho_1^L}.$$

Accordingly, the shareholder's decision is determined by:

$$\Delta E = (1 - \rho_0)(y^* - y^*_{loan}) + \rho_0(1 - \rho_1^L)[V_2 - (1 + y^*_{loan})].$$

Solving $\Delta E = 0$, the resulting $\bar{C}$ is the same as in Equation 10.

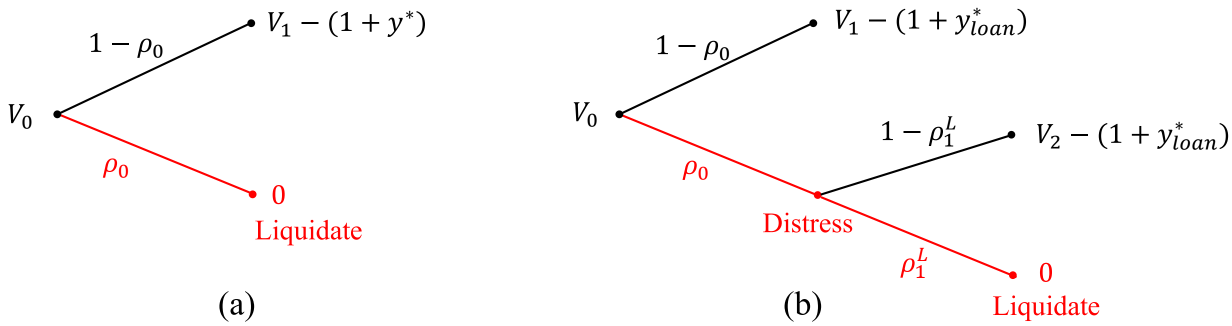


Figure A.2: The shareholder's payoff without renegotiation (Panel (a)) and with an extension option (Panel (b)). Here, I assume that at time 2, if the firm rehabilitates, the bank will receive both the principal and interest, resulting in a change to the shareholder's payoff.

Perspective on $\bar{C}$ from the stakeholder The threshold that determines the renegotiation feasibility is given by $\bar{C}$, above which the loan rate becomes too high that the shareholder is not willing to pay. To better understand this threshold, I look at the firm asset dynamics with and without renegotiation. Denoting the asset value at time t as V_t, and plot the asset dynamics in the following figure. Comparing the asset value difference with and without renegotiation, I find:

$$\begin{aligned} \Delta V &= (1 - \rho_0)(V_1 - V_1) + \rho_0(1 - \rho_1^L)V_2 + \rho_0\rho_1^L(1 - \alpha) - \rho_0(1 - \alpha) \\ &= \alpha\rho_0 - \alpha\rho_0\rho_1^L + \rho_0(1 - \rho_1^L)(V_2 - 1) = \rho_0\bar{C}. \end{aligned} \tag{A.1}$$

Renegotiation feasibility in mixed borrowing without hold-out problem In the mixed borrowing case, when there is renegotiation, the break-even rates for the loan and bond are $y^*_{loan,mix}$ and $y^*_{bond,mix}$, as given in Equation 17. I now show that shareholders decide whether to facilitate the renegotiation based on different levels of renegotiation costs. To

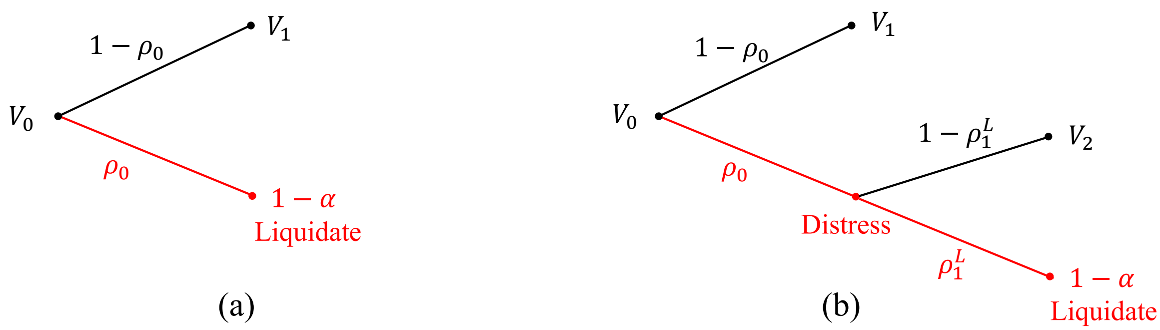


Figure A.3: Asset dynamics without renegotiation (Panel (a)) and with an extension option (Panel (b)). When the firm is solvent, the asset value at time 1 is always V_1, and it will be distributed between the shareholder and debt holder. When the firm defaults, without the renegotiation, the remaining asset value is $1-\alpha$, which will be passed to debt holders. With the extension option, the firm may recover from distress.

illustrate this, I plot the cash flow of the shareholders in Figure A.4. The left panel illustrates the no-renegotiation situation: at time 1, the shareholder pays back the debt principal and the interest y_{total}, receiving the remaining asset in the up state. The total interest is given by:

$$y_{total} = (1-F_b)y_l^* + F_b y_b^* = \frac{\alpha\rho_0}{1-\rho_0} = y^*. \tag{A.2}$$

In the right panel, the shareholder needs to pay an interest of $y^*_{loan,mix}$ in the solvent state to facilitate the bank to renegotiate. Since there is no hold-out problem, the bondholders can break even with rate $y^*_{bond,mix}$, so the total cost of debt with renegotiation is:

$$y_{total,reneg} = (1-F_b)y^*_{loan,mix} + F_b y^*_{bond,mix} = \frac{\alpha\rho_0\rho_1^L + \rho_0 C}{1-\rho_0} = y^*_{loan}. \tag{A.3}$$

Comparing the equity claim with and without renegotiation, I denote the difference as ΔE:

$$\Delta E = (1-\rho_0)(y_{total} - y_{total,reneg}) + \rho_0(1-\rho_1^L)(V_2 - 1). \tag{A.4}$$

The condition $\Delta E > 0$ corresponds to a maximum renegotiation cost of

$$\bar{C} = \alpha(1-\rho_1^L) + (1-\rho_1^L)(V_2 - 1), \tag{A.5}$$

which is the same threshold as in the pure bank borrowing case.

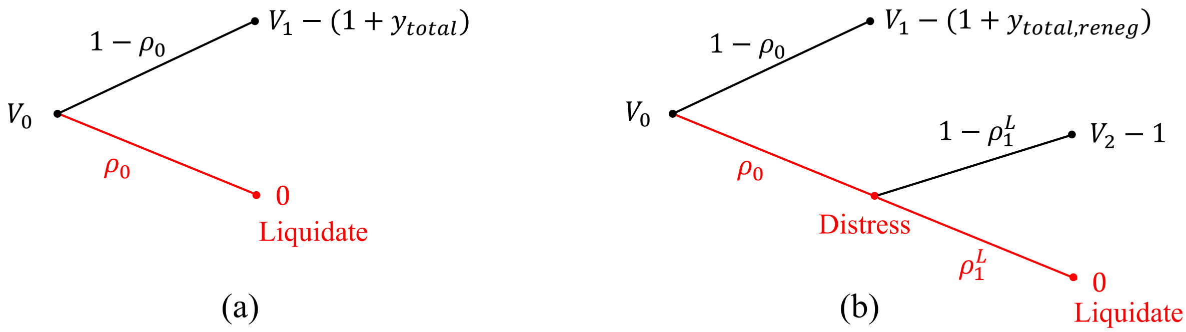


Figure A.4: The shareholder's payoff without renegotiation (Panel (a)) and with an extension option (Panel (b)), when the firm borrows from both a relationship bank (face value $1-F_b$, and the corporate bond market (face value F_b).

Renegotiation feasibility in mixed borrowing with hold-out problem In the mixed borrowing case, when taking into account the hold-out problem, the break-even rates become $y^*_{loan,mix}$ and $y^*_{\text{bond, holdout}}$. I now analyze the shareholders' break-even condition to determine when it is optimal for shareholders to choose the renegotiation rate. While the payoff structure is the same as in Figure A.4, the total cost of debt with renegotiation now depends on the hold-out severity h:

$$\begin{aligned} y_{total,reneg}(h) &= (1-F_b)y^*_{loan,mix} + F_b y^*_{bond,holdout} \\ &= \frac{\alpha\rho_0\rho_1^L + \rho_0 C}{1-\rho_0} + \frac{F_b\rho_0 h}{1-\rho_0} \\ &= y^*_{loan} + \frac{F_b\rho_0 h}{1-\rho_0}. \end{aligned} \tag{A.6}$$

The benefit of the renegotiation for shareholders is then:

$$\Delta E(h) = (1-\rho_0)(y_{total} - y_{total,reneg}(h)) + \rho_0(1-\rho_1^L)(V_2-1). \tag{A.7}$$

When $\Delta E(h) = 0$, denote the solution for C as $\bar{C}_h$:

$$\begin{aligned} \bar{C}_h &= \alpha(1-\rho_1^L) + (1-\rho_1^L)(V_2 - 1) - F_b h \\ &= \bar{C} - F_b h. \end{aligned} \tag{A.8}$$

If $h = 0$ or $F_b = 0$, there is no hold-out problem or no bond borrowing, the threshold $\bar{C}_h$ is the same as the pure bank borrowing case.

As F_b or h increases, the threshold decreases, meaning it is more challenging to renegotiate (or more likely to reach the no-renegotiation region).

A.2 The value of a prepayment option

To explore the dynamics of the prepayment option, I consider a two-period loan contract. This setup captures how credit risk evolves over time and the strategic interactions between borrower and lender. The payoff of the debt contract is depicted in Figure A.5.

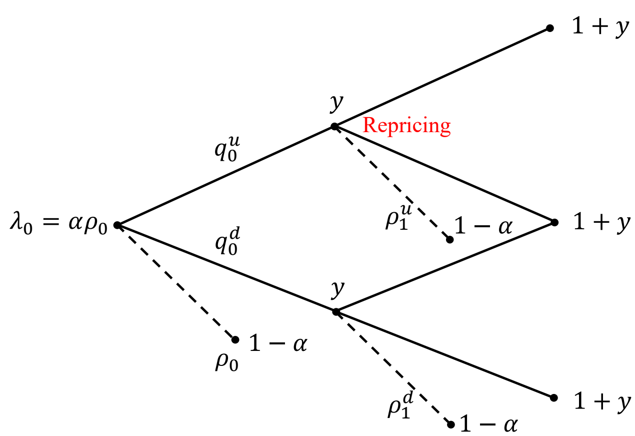


Figure A.5: The two-period debt with a prepayment option. The variable λ denotes the short-term credit risk of a firm. In the up-state with a probability of q_t^u, the firm's credit quality improves, and in the down-state with a probability of q_t^d, the firm's credit quality deteriorates. The branches plotted in dashed lines denote the default states.

Assume the state variable λ represents the short-term credit risk of the borrower and that there is a constant loss given default α, the face value of debt is normalized to 1. The repayment schedule is as follows: at time $t = 1$, the firm repays a pre-specified interest rate y, and at time

$t = 2$, it repays both the principal and the interest, $1+y$. If the firm defaults with a probability ρ_t, it is liquidated, and the bank recovers a fraction $(1-\alpha)$ of the face value. If the firm remains solvent, the credit quality may either improve (up-state) or deteriorate (down-state), with associated risk-neutral probabilities q_t^u and q_t^d, respectively. At each node, the probabilities sum to one,

$$q_t^u + q_t^d + \rho_t = 1. \tag{A.9}$$

The fair coupon rate for the debt, when traded at par, can be calculated using:

$$1 = y(1-\rho_0) + (1-\alpha)\rho_0 + (1+y)[q_0^u(1-\rho_1^u) + q_0^d(1-\rho_1^d)] + (1-\alpha)[q_0^u\rho_1^u + q_0^d\rho_1^d]. \tag{A.10}$$

Solving for y, and denoting the solution as y_2^*,

$$y_2^* = \frac{\alpha\rho_0 + \alpha(q_0^u\rho_1^u + q_0^d\rho_1^d)}{(1-\rho_0) + q_0^u(1-\rho_1^u) + q_0^d(1-\rho_1^d)}. \tag{A.11}$$

Next, I consider a scenario in which the bank anticipates that, if the firm's credit quality improves at time 1, the firm will request a repricing of the second-period interest rate. Since the borrower can prepay the loan at a low cost, it has the bargaining power to terminate the existing contract and initiate a new one if the bank disagrees with the requested rate adjustment. This repricing only occurs if the firm's credit quality improves in the up-state at time 1, allowing the borrower to demand a lower interest rate for the second period. Conversely, if the firm's credit deteriorates, it retains the original contract, which is preferable. This self-selection feature aligns with the findings of Roberts and Sufi (2009) and Roberts (2015). Anticipating the repricing activity, banks will require compensation for the prepayment and repricing risk. To determine the value of this compensation, I first derive the adjusted yield requested by the borrower in the up-state, denoted as y_u. I define y_u as the fair yield of a one-period debt conditional on arriving in the up-state at time $t = 1$, which is equivalent to the firm terminating the original debt and initiating a new one. The adjusted yield must satisfy:

$$1 = (1+y)(1-\rho_1^u) + (1-\alpha)\rho_1^u. \tag{A.12}$$

The solution is,

$$y_u = \frac{\alpha \rho_1^u}{1-\rho_1^u}. \tag{A.13}$$

I show that y_u is always smaller than the original fair yield y_2^* (see the following mathematical proof). The adjusted yield y_u is lower because it only accounts for the reduced credit risk after the firm's credit health has improved, whereas y_2^* also accounts for the worse outcomes in the down-state. Given the requested new yield, the value of the prepayment option, P, is

$$P = q_0^u (y_2^* - y_u)(1-\rho_1^u). \tag{A.14}$$

It represents the difference between the original fair yield and the adjusted yield that the bank can receive at time 2, conditional on the firm reaching the up-state at time 1 and remaining solvent at time 2. The option value would increase with q_0^u, and decrease with ρ_1^u (or λ_1^u) since the multiplier $y_2^* - y_u$ is positive. This intuition makes sense: when it is more likely to reach the up-state, the firm is more likely to exercise the option, making the prepayment option more valuable. Similarly, when the firm's credit quality gets a larger improvement (ρ_1^u decreases), the prepayment option value increases as the adjusted yield becomes even more attractive.

Mathematically, I find that while the option value indeed decreases with λ_1^u ($\frac{\partial P}{\partial \lambda_1^u} < 0$), the relationship with q_0^u is more complex. To examine the dynamics of the option value with q_0^u, I solve the first-order condition $\frac{\partial P}{\partial q_0^u} = 0$, and identify the value of q_0^{u*} that maximizes P,

$$q_0^{u*} = \frac{-(1-\rho)(2-\rho_1^d) + \sqrt{(1-\rho)(2-\rho)(2-\rho_1^d)(1-\rho_1^u)}}{\rho_1^d - \rho_1^u}. \tag{A.15}$$

By making very mild assumptions on the parameters, I approximate that q_0^{u*} is in the range of 0.7 to 0.83 (see the following mathematical proof). So, the option value first increases with q_0^u, but peaks when q_0^u reaches a threshold of around 70% and then starts to decrease. Intuitively, the option price increases in the probability q_0^u as it becomes more likely for the firm to exercise the option. Simultaneously, the original yield y_2^* decreases as q_0^u rises. Once q_0^u reaches the threshold, the yield difference between the original and renewed contracts becomes very small, which makes the prepayment option less attractive, explaining why the option value starts to decrease thereafter. However, this threshold of 0.7 is much larger than the realistic value of q_0^u that is typically assumed to be around 0.5. Thus, I conclude that in most cases, P increases with q_0^u.

I also find that the prepayment option price increases with λ_0. Since q_0^u, y_u, and λ_1^u are uncorrelated with λ_0, the option price depends on λ_0 only through y_2^*. Thus, $\frac{\partial P}{\partial \lambda_0}$ has the same sign as $\frac{\partial y_2^*}{\partial \lambda_0}$, which is positive.

To derive the price of the option as a function of the debt's coupon, I add the prepayment option value to the left-hand side of Equation A.10:

$$1 + P = y(1-\rho_0) + (1-\alpha)\rho_0 + (1+y)[q_0^u(1-\rho_1^u) + q_0^d(1-\rho_1^d)] + (1-\alpha)[q_0^u\rho_1^u + q_0^d\rho_1^d]. \quad \text{(A.16)}$$

Solving for the yield that a bank should charge ex ante to account for the prepayment risk, and denoting the solution as y_p^*,

$$y_p^* = y_2^* + \underbrace{\frac{P}{(1-\rho_0) + q_0^u(1-\rho_1^u) + q_0^d(1-\rho_1^d)}}_{\text{Prepayment premium}}. \quad \text{(A.17)}$$

Calibration It turns out that the prepayment compensation term is very small compared to y_2^*. Based on a calibration using parameters of $\rho_0 = 4\%, \rho_1^u = 2.4\%, \rho_1^d = 6.7\%, \alpha = 50\%, q_0^u = 50\%, q_0^d = 46\%$, I find a fair yield y_2^* of 245 bps, with a prepayment compensation of only 25 bps. The small size of this adjustment is also evident from the prepayment option value in Equation A.14. The value is primarily determined by the yield difference between y_2^* and y_u, which is minimal. Consequently, it is not surprising that the compensation for the prepayment option is a very small fraction of the loan's fair yield.

The analysis shows that while prepayment flexibility is a distinct advantage of bank loans, its contribution to the overall loan premium is small. Furthermore, it remains an empirical question whether prepayment risk is incorporated into the interest rate, thereby contributing to the loan premium. If prepayment risk is priced into the loan premium, the model suggests that the premium will increase when there is a higher probability of the firm's credit quality improving; and when the expected improvement is larger.

Mathematical proof in the prepayment option The value of the prepayment option P, the initial interest rate without prepayment option y_2^*, and the requested new interest rate y_r^* are given by,

$$P = q_0^u(y_2^* - y_u)(1-\rho_1^u),$$

$$y_2^* = \frac{\alpha\rho_0 + \alpha(q_0^u\rho_1^u + q_0^d\rho_1^d)}{(1-\rho_0) + q_0^u(1-\rho_1^u) + q_0^d(1-\rho_1^d)}, \quad \text{and} \quad y_u = \frac{\alpha\rho_1^u}{1-\rho_1^u}.$$

Denote $\hat{\rho} = q_0^u\rho_1^u + q_0^d\rho_1^d$, y_2^* can be rewritten as,

$$y_2^* = \frac{\alpha\rho_0 + \alpha\hat{\rho}}{2(1-\rho_0) - \hat{\rho}}.$$

Prove that $y_2^* > y_u$:

$$\begin{aligned} y_2^* - y_u &= \frac{(\alpha\rho_0 + \alpha\hat{\rho})(1-\rho_1^u) - \alpha\rho_1^u[2(1-\rho_0)-\hat{\rho}]}{[2(1-\rho_0)-\hat{\rho}](1-\rho_1^u)} \\ &= \alpha\frac{\rho_0 + \hat{\rho} + \rho_0\rho_1^u - 2\rho_1^u}{[2(1-\rho_0)-\hat{\rho}](1-\rho_1^u)} \\ &= \alpha\frac{(\rho_0 - \rho_1^u) + (\hat{\rho} + \rho_0\rho_1^u - \rho_1^u)}{[2(1-\rho_0)-\hat{\rho}](1-\rho_1^u)} \end{aligned} \tag{A.18}$$

I show that $\hat{\rho} + \rho_0\rho_1^u - \rho_1^u = q_0^u\rho_1^u + q_0^d\rho_1^d + \rho_0\rho_1^u - \rho_1^u = q_0^d(\rho_1^d - \rho_1^u) > 0$. Since both the value of $\rho_0 - \rho_1^u$ and $\hat{\rho} + \rho_0\rho_1^u - \rho_1^u$ are positive, Equation A.18 is positive since the denominator is also positive.

Prove that P decreases in ρ_1^u: Since λ_1^u is independent of q_0^u, I only need to examine the partial derivative of $\tilde{P} \equiv (y_2^* - y_u)(1-\rho_1^u)$ with respect to ρ_1^u.

$$\begin{aligned} \tilde{P} &= (y_2^* - y_u)(1-\rho_1^u) \\ &= \alpha\frac{\rho_0 + \hat{\rho} + \rho_0\rho_1^u - 2\rho_1^u}{[2(1-\rho_0)-\hat{\rho}]} \\ &= \alpha\left(\frac{(2-\rho_0)(1-\rho_1^u)}{[2(1-\rho_0)-\hat{\rho}]} - 1\right). \end{aligned} \tag{A.19}$$

The partial derivative is,

$$\begin{aligned}
\frac{\partial \tilde{P}}{\partial \rho_1^u} &= \alpha \frac{-(2-\rho_0)[2(1-\rho_0)-\hat{\rho}] + (2-\rho_0)(1-\rho_1^u)q_0^u}{[2(1-\rho_0)-\hat{\rho}]^2} \\
&= \alpha \frac{(2-\rho_0)[-2(1-\rho_0) + q_0^u\rho_1^u + q_0^d\rho_1^d + (1-\rho_1^u)q_0^u]}{[2(1-\rho_0)-\hat{\rho}]^2} \\
&= \alpha \frac{(2-\rho_0)[-2(1-\rho_0) + q_0^u + q_0^d\rho_1^d}{[2(1-\rho_0)-\hat{\rho}]^2} \\
&= \alpha \frac{(2-\rho_0)[-2(1-\rho_0) + 1 - \rho_0 - q_0^d + q_0^d\rho_1^d}{[2(1-\rho_0)-\hat{\rho}]^2} \\
&= \alpha \frac{(2-\rho_0)[-(1-\rho_0) - q_0^d(1-\rho_1^d)]}{[2(1-\rho_0)-\hat{\rho}]^2} < 0.
\end{aligned} \tag{A.20}$$

Prove that y_2^* is decreasing in q_0^u: Since $\frac{\hat{\rho}}{\partial q_0^u} = \rho_1^u - \rho_1^d < 0$, and

$$\begin{aligned}
\frac{\partial y_2^*}{\partial q_0^u} &= \alpha \frac{(\rho_1^u - \rho_1^d)[2(1-\rho_0)-\hat{\rho}] + (\rho_0+\hat{\rho})(\rho_1^u - \rho_1^d)}{[2(1-\rho_0)-\hat{\rho}]^2} \\
&= \alpha \frac{(\rho_1^u - \rho_1^d)[2(1-\rho_0)-\hat{\rho}+\rho_0+\hat{\rho}]}{[2(1-\rho_0)-\hat{\rho}]^2} \\
&= \alpha \frac{(\rho_1^u - \rho_1^d)(2-\rho_0)}{[2(1-\rho_0)-\hat{\rho}]^2} < 0.
\end{aligned} \tag{A.21}$$

To examine whether the option value P is increasing or decreasing in q_0^u (i.e. the sign of $\frac{\partial P}{\partial q_0^u}$), I define $\hat{P} \equiv q_0^u(y_2^* - y_u)$ since q_0^u is independent of $(1-\lambda_1^u)$ and $(1+r)^2$, so,

$$\begin{aligned}
\frac{\partial \hat{P}}{\partial q_0^u} &= (y_2^* - y_u) + q_0^u \frac{\partial y_2^*}{\partial q_0^u} \\
&= \alpha \frac{(\rho_0 - \rho_1^u) + q_0^d(\rho_1^d - \rho_1^u)}{[2(1-\rho_0)-\hat{\rho}](1-\rho_1^u)} + q_0^u \alpha \frac{(\rho_1^u - \rho_1^d)(2-\rho_0)}{[2(1-\rho_0)-\hat{\rho}]^2}.
\end{aligned} \tag{A.22}$$

Denote $\epsilon = \rho_1^d - \rho_1^u$,

$$\frac{\partial \hat{P}}{\partial q_0^u} = \alpha \frac{(\rho_0 - \rho_1^u) + q_0^d \epsilon}{[2(1-\rho_0)-\hat{\rho}](1-\rho_1^u)} + q_0^u \alpha \frac{-\epsilon(2-\rho_0)}{[2(1-\rho_0)-\hat{\rho}]^2}. \tag{A.23}$$

The first-order condition is,

$$\frac{\partial \hat{P}}{\partial q_0^u} = \alpha \frac{(\rho_0 - \rho_1^u) + q_0^d \epsilon}{[2(1-\rho_0) - \hat{\rho}](1-\rho_1^u)} - q_0^u \alpha \frac{\epsilon(2-\rho_0)}{[2(1-\rho_0) - \hat{\rho}]^2} = 0, \tag{A.24}$$

$$\frac{(\rho_0 - \rho_1^u) + (1-\rho_0 - q_0^u)\epsilon}{(1-\rho_1^u)} = \frac{q_0^u \epsilon (2-\rho_0)}{[2(1-\rho_0) + q_0^u \epsilon - (1-\rho_0)\rho_1^d]}. \tag{A.25}$$

Denote $\tilde{q} = q_0^u \epsilon$,

$$\frac{(\rho_0 - \rho_1^u) + (1-\rho_0)\epsilon - \tilde{q}}{(1-\rho_1^u)} = \frac{\tilde{q}(2-\rho_0)}{[2(1-\rho_0) + \tilde{q} - (1-\rho_0)\rho_1^d]}. \tag{A.26}$$

It is a quadratic function of $\tilde{q}$,

$$[(\rho_0 - \rho_1^u) + (1-\rho_0)\epsilon - \tilde{q}][2(1-\rho_0) - (1-\rho_0)\rho_1^d + \tilde{q}] - \tilde{q}(1-\rho_1^u)(2-\rho_0) = 0. \tag{A.27}$$

I rewrite it as,

$$\tilde{q}^2 + 2(1-\rho)(2-\rho_1^d)\tilde{q} - (1-\rho)(2-\rho_1^d)[(\rho_0 - \rho_1^u) + (1-\rho)\epsilon] = 0. \tag{A.28}$$

Roots for this quadratic function always exist because the discriminant is,

$$[2(1-\rho)(2-\rho_1^d)]^2 + r(1-\rho)(2-\rho_1^d)[(\rho_0 - \rho_1^u) + (1-\rho)\epsilon] > 0.$$

The positive root is:

$$\begin{aligned}\tilde{q} &= -(1-\rho)(2-\rho_1^d) + \sqrt{[(1-\rho)(2-\rho_1^d)]^2 + (1-\rho)(2-\rho_1^d)[(\rho_0 - \rho_1^u) + (1-\rho)\epsilon]} \\ &= -(1-\rho)(2-\rho_1^d) + \sqrt{(1-\rho)(2-\rho)(2-\rho_1^d)(1-\rho_1^u)}.\end{aligned} \tag{A.29}$$

The corresponding root for q_0^u is:

$$q_0^{u*} = \frac{-(1-\rho)(2-\rho_1^d) + \sqrt{(1-\rho)(2-\rho)(2-\rho_1^d)(1-\rho_1^u)}}{\rho_1^d - \rho_1^u}. \tag{A.30}$$

I further show that q_0^{u*} approaches 0.75 as ρ approaches zero. Proof is as follows. To approximate the quotient of two small values as in Equation A.30, I take the expression of the default probability at time 1 as, $\rho_1^u = \rho_0 - \beta$, $\rho_1^d = \rho_0 + \kappa\beta$. This does not imply that ρ_1^u and ρ_1^d are perfectly linear in ρ_0; rather, they are simply offset with respect to ρ_0. Since ρ_0 is very small, $\beta \approx 0$, and the movement of the credit spread may be asymmetric if $\kappa \neq 1$ (with κ being positive). Assume the upward movement is not significantly different from the downward movement, κ should not deviate much from 1. Rewrite Equation A.30 as:

$$q_0^{u*} = \frac{(1-\rho)(2-\rho_1^d)\left[-1+\sqrt{\frac{(2-\rho)(1-\rho_1^u)}{(1-\rho)(2-\rho_1^d)}}\right]}{(1+\kappa)\beta}. \tag{A.31}$$

A linear approximation of $-1+\sqrt{\frac{(2-\rho)(1-\rho_1^u)}{(1-\rho)(2-\rho_1^d)}}$ around $\beta = 0$ is:

$$\begin{aligned} -1+\sqrt{\frac{(2-\rho)(1-\rho_1^u)}{(1-\rho)(2-\rho_1^d)}} &\approx -1+\sqrt{\frac{(2-\rho)(1-\rho)}{(1-\rho)(2-\rho)}} + \frac{\beta}{2}\sqrt{\frac{(2-\rho)(1-\rho)}{(1-\rho)(2-\rho)}}\frac{(2-\rho)+(1-\rho)\kappa}{(2-\rho)^2} \\ &= \frac{\beta}{2}\frac{(2-\rho)+(1-\rho)\kappa}{(2-\rho)(1-\rho)}. \end{aligned} \tag{A.32}$$

Thus,

$$q_0^{u*} \approx \frac{(1-\rho)(2-\rho)}{(1+\kappa)\beta}\frac{\beta}{2}\frac{(2-\rho)+(1-\rho)\kappa}{(2-\rho)(1-\rho)} = \frac{1+(1-\rho)(1+\kappa)}{2(1+\kappa)}. \tag{A.33}$$

If κ is in the range from 0.5 to 1.5, then as λ_0 approaches zero, q_0^{u*} will be in the range between 0.7 and 0.83. If $\kappa = 1$, meaning the upward and downward movements are symmetric, then q_0^{u*} will approach 0.75.

A.3 Additional figures and tables

Figure A.6: The total amount and average amount of loans in the final sample.

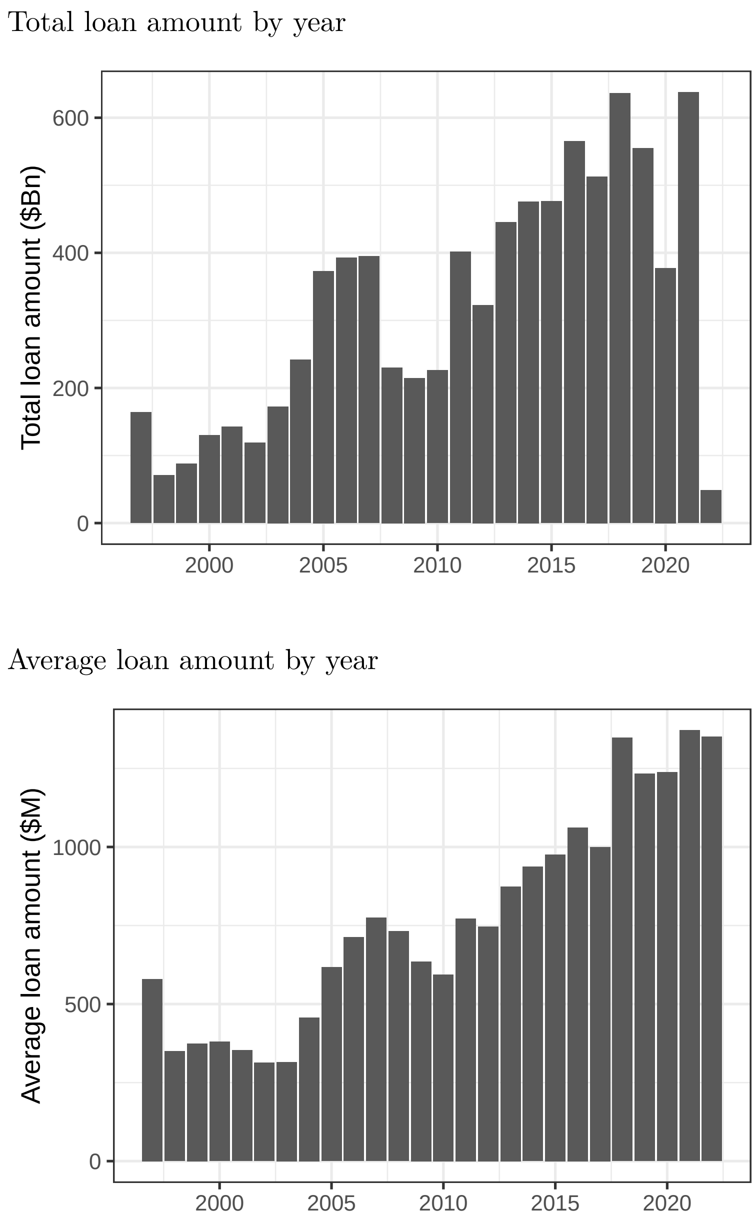
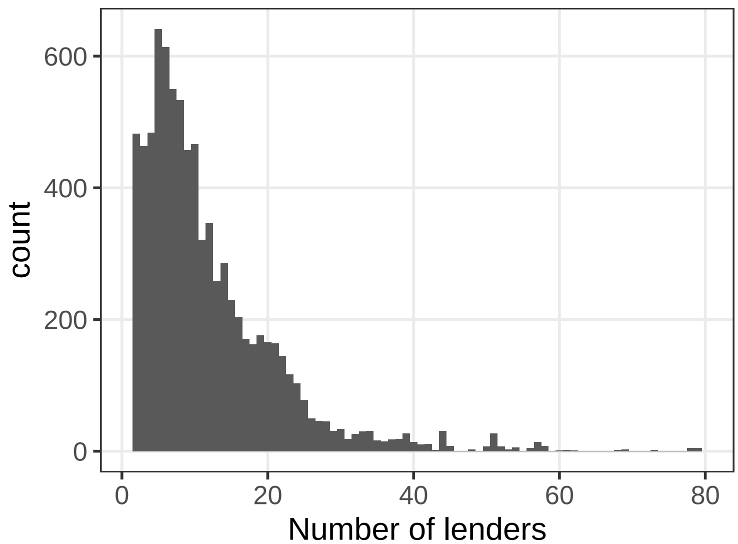


Figure A.7: The histogram of the number of lenders and number of lead arrangers of the loans in the final sample.

(a) All lenders



(b) Lead arrangers

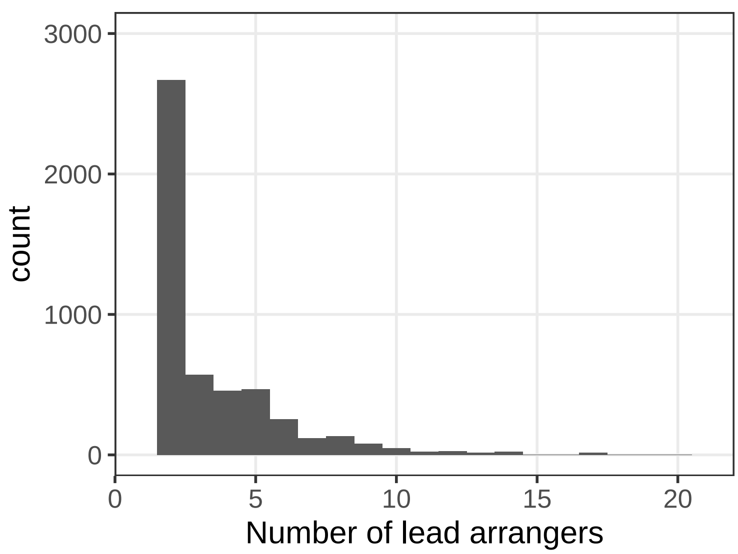


Table A.I: Numeric Rating Scores.

Value	S&P	Moody's	Category
1	AAA	Aaa	Investment Grade
2	AA+	Aa1	
3	AA	Aa2	
4	AA-	Aa3	
5	A+	A1	
6	A	A2	
7	A-	A3	
8	BBB+	Baa1	
9	BBB	Baa2	
10	BBB-	Baa3	
11	BB+	Ba1	Non-Investment Grade
12	BB	Ba2	
13	BB-	Ba3	
14	B+	B1	
15	B	B2	
16	B-	B3	
17	CCC+	Caa1	
18	CCC	Caa2	
19	CCC-	Caa3	
20	CC	Ca	
21	C		
25	D	C	Default

Table A.II: Notation Table

Symbol/Term	Definition
Modeling	
λ	Short-term credit risk of a firm (borrower)
α	Loss given default, assumed constant throughout the debt duration
ρ_0	Initial short-term probability of default at time 0
ρ_1^L	Probability of default in the second period after renegotiation
y^*	Benchmark yield on debt without renegotiation
$\underline{y}^*$	Reduced benchmark yield after renegotiation without considering costs
y^*_{loan}	Pure loan yield incorporating renegotiation costs
y^*_l	Senior loan benchmark yield without renegotiation
y^*_b	Junior bond benchmark yield without renegotiation
$y^*_{loan,mix}$	Senior loan yield with renegotiation without hold-out problem
$y^*_{bond,mix}$	Junior bond yield with renegotiation without hold-out problem
$y^*_{bond,holdout}$	Junior bond yield with renegotiation considering hold-out problem
$y_{bond,adj}$	Seniority-adjusted bond yield with renegotiation without hold-out problem
$y_{bond,adj,holdout}$	Seniority-adjusted bond yield with renegotiation considering hold-out problem
F_b	Face value of junior bond in mixed borrowing
V_t	Borrower's asset value at time t
C	Renegotiation cost incurred by the bank
$\bar{C}$	Maximum renegotiation cost threshold without hold-out problem
$\bar{C}_h$	Maximum renegotiation cost threshold considering hold-out problem
h	Fraction of hold-out cost
π_L	Loan premium without hold-out problem
π_L^h	Loan premium considering hold-out problem
Empirical measures	
Book debt	Total long-term debt plus current liabilities
Market asset	Book debt plus equity market capitalization
Market leverage	Ratio of book debt to market asset
Equity volatility	Annualized standard deviation of daily stock returns over the previous year
Asset volatility	Unlevered volatility of the equity volatility
Trailing stock ret	Firm's stock return over the previous year
Subsequent stock ret	Firm's stock return over the following year
Asset tangibility	Ratio of tangible asset to book assets
Profitability	Ratio of operating income before depreciation to book assets

Table A.III: This table reports the response of loan premium to the unanticipated ruling shock, including the sample period after 2016. The regression formula is Loan premium$_{i,t}$ = $\beta_1 M_t + \beta_2 B_{i,t} + \beta_3(M_t \times B_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + e_{i,t}$. The dependent variable, loan premium (bps), is the seniority-adjusted difference between the loan spread and bond spread for the same firm on the same date. The binary indicator M_t equals one if the loan is originated in 2015 or 2016, $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the median of 0.26. The variable of interest is the interaction $M_t \times B_{i,t}$. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year levels.

	Dependent variable:	
	Loan premium (reduced)	Loan premium (structural)
	(1)	(2)
Marblegate	9.245	5.252
	(6.119)	(20.359)
Bond intensive	4.288	46.338***
	(5.054)	(11.630)
Marblegate*Bond intensive	−14.636**	−69.279***
	(7.130)	(17.263)
Industry FE	Yes	Yes
Year FE	No	No
Observations	10,852	4,304
R^2	0.044	0.072
Adjusted R^2	0.039	0.059
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table A.IV: This table reports the response of loan spread and seniority-adjusted bond spread to the unanticipated ruling shock, the sample is restricted to before and including the year 2016. The regression formula is $\text{Loan/BILS}_{i,t} = \beta_1 M_t + \beta_2 B_{i,t} + \beta_3 (M_t \times B_{i,t}) + \tau_s + e_{i,t}$. The dependent variable is the all-in-drawn spread (bps) in column (1), and the seniority-adjusted bond spread (bps) in column (2). The binary indicator M_t equals one if the loan is originated in 2015 or 2016, $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the median of 0.26. The variable of interest is the interaction $M_t \times B_{i,t}$. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year level.

	Dependent variable:	
	Loan AIDS	BILS (reduced)
	(1)	(2)
Marblegate	9.723	−4.277
	(14.918)	(13.250)
Bond intensive	53.792***	45.007***
	(6.195)	(7.619)
Marblegate*Bond intensive	−25.186***	−6.962
	(6.376)	(10.395)
Industry FE	Yes	Yes
Year FE	No	No
Observations	8,607	8,607
R^2	0.128	0.099
Adjusted R^2	0.122	0.093
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table A.V: This table reports the response of monthly bond spread / bond return to the unanticipated ruling shock, the sample is restricted to before and including the year 2016. The regression formula is Bond spread/return$_{i,t}$ $= \beta_3(M_t \times B_{i,t}) + FE + e_{i,t}$. The dependent variable is monthly bond spread (bps) in column (1) and monthly bond return in column (2), both price information is collected from the Trace database. The binary indicator M_t equals one if the loan is originated in 2015 or 2016, $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the median of 0.183 (due to an enlarged sample size, the median bond holding changes in this test). The variable of interest is the interaction $M_t \times B_{i,t}$. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at bond and month level.

	Dependent variable:	
	Monthly bond spread (Trace)	Monthly bond return (Trace)
	(1)	(2)
Marblegate*Bond intensive	19.504	0.001
	(25.122)	(0.001)
Bond FE	Yes	Yes
Month FE	Yes	Yes
Bond Cluster	Yes	Yes
Month Cluster	Yes	Yes
Observations	242,756	236,100
R^2	0.577	0.086
Adjusted R^2	0.554	0.042
Note:		*p<0.1; **p<0.05; ***p<0.01

Table A.VI: This table reports the response of loan premium to the unanticipated ruling shock, including the sample period before and including 2016, and restricted to term loans only. The regression formula is Loan premium$_{i,t} = \beta_1 M_t + \beta_2 B_{i,t} + \beta_3(M_t \times B_{i,t}) + \boldsymbol{x}_{i,t}\boldsymbol{\gamma} + \tau_s + e_{i,t}$. The dependent variable, loan premium (bps), is the seniority-adjusted difference between the loan spread and bond spread for the same firm on the same date. The binary indicator M_t equals one if the loan is originated in 2015 or 2016, $B_{i,t}$ is an indicator that equals one when the issuer firm's bond holding is above the median of 0.289. The variable of interest is the interaction $M_t \times B_{i,t}$. Sector fixed effects are based on 2-digit SIC sectors. Standard errors are clustered at issuer firm and year levels.

	Dependent variable:	
	Loan premium (reduced)	Loan premium (structural)
	(1)	(2)
Marblegate	3.537	39.587*
	(10.816)	(22.549)
Bond intensive	15.215*	88.310**
	(8.537)	(36.179)
Marblegate*Bond intensive	3.578	−83.214**
	(14.954)	(34.876)
Industry FE	Yes	Yes
Year FE	No	No
Observations	2,417	1,126
R^2	0.069	0.124
Adjusted R^2	0.047	0.079
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table A.VII: This table reports the regression of the actual change of issuer's rating score on the CDS spread (pp) The estimation is specified by Rating score change$_{i,t} = \beta_1$CDS spread$_{i,t} + \beta_2$Initial rating$_{i,t} + \tau_s + \theta_t + e_{i,t}$. The dependent variable is the actual change of the loan issuer's rating within five years after the loan origination. As a comparison, I re-run the regression using the loan premium as a predictor, based on the sample where the CDS spread is available. Sector fixed effects are based on 2-digit SIC sectors.

	Dependent variable:		
	Rating change (score) within 5 years		
	(1)	(2)	(3)
CDS spread (5Y)	0.003		
	(0.002)		
Loan premium (reduced)		-0.058^{***}	
		(0.017)	
Loan premium (structural)			-0.013^{*}
			(0.008)
Initial rating	-0.083^{***}	-0.077^{***}	-0.066^{***}
	(0.007)	(0.007)	(0.011)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	3,708	3,708	1,758
R^2	0.113	0.116	0.114
Adjusted R^2	0.095	0.098	0.078
Note:			*p<0.1; **p<0.05; ***p<0.01