Penalty-free Prepayments, Credit Rationing and the Use of Upfront Fees in Bank Loans

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Abstract

We show that the use of non-interest terms in bank loans is a way to maintain the borrowers' flexibility to prepay freely. If voluntary prepayments are penalty-free, as widely observed for bank loans in practice, over time good borrowers prepay their loans while bad borrowers stay. This reclassification effect leaves the lender with bad borrowers only. Increasing the interest rate is not sufficient to compensate the lender for the prepayment risk, so the bank resorts to non-interest credit rationing. In addition to non-price instruments such as collateral, a non-linear pricing approach, in which the loan price is split into the interest and the upfront fee, can be employed. The model predicts that: higher loan prices and lower refinancing costs are associated with higher upfront fees; secured loans use higher upfront fees, but performance-sensitive loans use lower. Empirical evidence supports these predictions. Using a sample of 29,510 term loans to U.S. firms between 1992 and 2011, we find that a 100 basis points increase in the loan spread leads to an average increase in the upfront fee by over 15 basis points. Loans with higher refinancing costs, unsecured loans and performance-sensitive loans are in general associated with lower upfront fees.

Keywords: *credit rationing, upfront fee, borrower risk, performance-pricing, security, collateral*

JEL Classifications: *D82, G21*

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1 Introduction

What makes bank loans special? The literature emphasizes the bank's ability to renegotiate the terms of existing loans (e.g. Bolton and Scharfstein, 1996; Gorton and Kahn, 2000). Empirically, Roberts (2010) reports that most bank loans are renegotiated multiple times over relatively short time horizons, leading to significant changes in the loan terms.[1] We can consider each change of the contract terms as prepaying the original loan and refinancing it through a new one. That is, prepayments of bank loans are widely observed. However, unlike most bonds, which have long no-call periods and high call premiums, most loans are prepayable at any time typically without prepayment fees (Standard&Poor's, 2009).[2] Why are bank lenders, in contrast to bondholders, willing to accept prepayments without penalty or, in other words, how are bank lenders compensated for the prepayment risk?

In this paper, we answer this question by linking penalty-free prepayments with credit rationing. We show that non-interest terms is necessary to maintain the borrowers' flexibility to prepay bank loans freely. If voluntary prepayments are penalty-free as widely observed in practice, over time good borrowers prepay their loans while bad borrowers stay. This reclassification effect leaves the lender with bad borrowers only. Increasing the interest rate is not sufficient to compensate for the prepayment risk, so the lender resorts to non-interest credit rationing, for example, using collateral or the upfront fee.[3] The model predicts that higher upfront fees are associated with higher loan price and/or lower refinancing costs, and that secured loans and/or performance-sensitive loans use higher upfront fees. We provide supportive evidence concerning these predictions through a sample of term loans to U.S.

[1] In his sample, ignoring the few short-term loans that are not renegotiated, the typical loan is renegotiated four times, despite having a stated maturity of less than five years.

[2] Amir Sufi on his website, `http://faculty.chicagobooth.edu/amir.sufi/data.htm`, provides 3,720 loan contracts, of which none specifies a penalty for voluntary prepayments. It is very common that the following term is included in a loan contract: "the borrower may prepay any base rate borrowing in whole at any time, or from time to time in part, without premium or penalty".

[3] A frequently used term in the literature is *non-price credit rationing*, where *price* refers to the interest rate. Since the upfront fee is thought of as a part of the loan price, in this paper we instead use the term, *non-interest credit rationing*, describing the situation in which the bank uses instruments other than the interest rate to ration credit.

firms.

In our model, the borrower signs a loan contract with the lender to finance an investment project. Shortly after the project is started, there arrives a non-verifiable signal concerning the project's future payoff. This signal may induce strategic prepayments and renegotiations. If the signal is good, the project is better than ex-ante expected and the original interest rate is not *fair* anymore. Thus, the borrower refinances the original loan with a new cheaper loan. In this case, the lender is near to breakeven.[4] If the signal is bad, the project has negative NPV and the lender will lose money for sure. Conditional on a positive probability of prepayment, the lender always loses money ex ante. Increasing the interest rate alone is not sufficient to compensate the lender for prepayment risk because, no matter how high the original interest rate is, the lender cannot capture the upside of the project due to prepayment. Then the lender resorts to non-interest terms to protect herself from the prepayment risk, for example, by asking for collateral or reducing the loan size. This is consistent with the stylized facts in practice that, the interest spread is remarkably low, while non-price instruments such as collateral are widely observed debt features, especially for bank loans (v.s. corporate bonds).[5]

In addition to non-price instruments such as collateral, the lender can employ a non-linear pricing approach in which the price of the loan is split into two parts: one part, the interest, is linear in the loan amount and the other part, the upfront fee paid as a lump-sum, is non-linear. For a given project, the probability of prepayment is increasing with the interest rate. The upfront fee reduces the interest rate and hence mitigates the firm's incentive to prepay the loan early. The model as well as its extensions has several testable predictions concerning the use of upfront fees. First, loans with higher price require higher upfront fees to reduce

[4]The accrued interest can be ignored when the signal arrives *soon* after the project is started. A high interest before the signal is infeasible, because it may take away all the payoff of the borrower in the case of the bad signal so that the borrower quits. More discussion is given in the model latter.

[5]Among more than 86,000 U.S. C&I loans in the DealScan database between 1987 and 2011, the interest spread over LIBOR has a mean 2.53% and standard deviation 1.58%, and around 84% are secured. For over 1.1 million U.S. small business loans issued between 1977 and 1988 in the dataset from the Federal Reserve's Survey of Terms of Bank Lending, the mean and standard deviation of the interest spread are 2.47% and 2.59% respectively, and over 70% are secured (Berger and Udell, 1992).

the interest rate and hence the prepayment risk. Second, loans with higher refinancing costs are less likely to be prepaid, so they are associated with lower upfront fees. Third, if the use of the upfront fee is costly for borrowers, who are usually liquidity-constrained at the borrowing time, and hence occurs only when collateral is exhausted, higher upfront fees are observed in secured loans. Finally, if the signal is verifiable, performance-pricing based on the signal mitigates prepayments and hence reduces the use of upfront fees.

To test these model implications, we construct a sample of 29,510 term loans to U.S. firms between 1992 and 2011. The information on upfront fees and other contract terms is from LPC DealScan. We use the loan spread as the proxy for the loan price and the dummies of syndication and institutional term loans (ITLs) as the proxy for the level of refinancing costs. Compared to traditional bank loans, syndication loans have multiple lenders while ITLs are traded in the secondary market. Both have complex structures and are associated with higher renegotiation and refinancing costs (e.g. Bolton and Scharfstein, 1996; Brunner and Krahnen, 2008). In our sample, around 16% of the term loans include the upfront fee information, which is approximately 31% of the interest spread of these loans. All the others have the upfront fee marked as "N/A". According to the LPC customer service, when no data was collected or provided for the upfront fee item, LPC leaves it as "N/A". Discussions with practical people in commercial banks suggest that most loans have an upfront fee, but it could be confidential in practice. We thus conjecture that the "N/As" include random missing values, zeros and self-selection hidden values. For this reason, we run three empirical models: OLS on non-missing values, Heckman selection model on the full sample, and OLS/Logit taking "N/As" as zeros. All the regression results are consistent with our model predictions. The use of upfront fees is positively correlated with the loan spread. A 100 basis points increase in the loan spread leads to an average increase in the upfront fee by over 15 basis points. Loans with higher refinancing costs, unsecured loans and performance-sensitive loans are in general associated with lower upfront fees.

Our paper links the two stylized facts in C&I loan markets, non-interest credit rationing and penalty-free prepayments, and we provide a rationale for the use of upfront fees. The credit rationing literature resorts to agency problems for the rationales of credit rationing, for example, adverse selection and risk shifting (e.g., Stiglitz and Weiss, 1981), costly state verification (e.g., Williamson, 1987), hidden effort (e.g., Holmstrom and Tirole, 1997). Although agency problems may still be the reason for penalty-free prepayments in C&I bank loans, we link the reclassication effect due to penalty-free prepayments with credit rationing and add a new angle to think about such a prevalent phenomenon. We also show how the non-interest terms such as collateral solve the rationing problem through mitigating the prepayment risk. This is in line with Bester (1985), Holmstrom and Tirole (1997), etc.

To our best knowledge, there are no extant papers studying prepayments and the use of upfront fees in C&I loans. In practice, bank loans usually allow penalty-free prepayments and a proportion of bank loans are associated with substantial upfront fees. However, the motive for using upfront fees is unclear. It is typically thought that the upfront fee is used to compensate the lender for fixed cost to originate the loan (e.g., Ivashina, 2009). If this is the only use of the upfront fee, it should not be highly corelated with the loan spread, after controlling for the other contract and firm characteristics. After all, the fixed costs can also be compensated through the loan interest. We are the first to argue that the upfront fee can be used as a substitute for penalty to mitigate prepayment risk. Unlike commercial bank loans, most of subprime mortgage loans have prepayment penalties. Mayer, Piskorski, and Tchistyi (forthcoming) illustrate that prepayment penalties in mortgages can be welfare-improving because they reduce the reclassification risk and benefit risky borrowers through extended credit availability. Their model shares the similar intuition with ours.[6]

There is a branch of the literature studying underwriting spread in IPOs, SEOs and bond issues (see e.g. the survey by Eckbo, Masulis, and Norli, 2007). The spread is the compensation paid to the underwriter for selling the firm's security issue, as a percentage of the capital raised. It is found that the underwriting spread is a U-shaped in the issue size (Altinkilic and

[6]Mortgage loans, like bonds, usually have fixed-rate, so changes of the market interest rate may be the key reasons for prepayments though Mayer, Piskorski, and Tchistyi (forthcoming) assume fixed market rate. This is different from C&I loans which has floating rates.

Hansen, 2000). As the issue size is increasing, the fixed cost of the underwriter(s) exhibits economies of scale, i.e., the average fixed cost is decreasing. At the same time, as the issue size is increasing for the same firm, the services such as underwriter certification, monitoring and marketing are more costly, so the underwriter spread may increase. Traditionally, the upfront fee in bank loans is also thought as an underwriting fee, compensating the lender for fixed costs (Ivashina, 2009). However, for bonds as well as IPOs and SEOs, the underwriter is only an intermediary, who helps the issuer to sell the security to investors while, for bank loans, the underwriter and the investor are the same. The underwriting spread of bonds is completely an intermediation fee, but the upfront fee in bank loans may not. In particular, since the lender is also the investor, she can charge the underwriter fees through increasing the interest rate. A lump-sum upfront fee seems unnecessary if it is only an intermediation fee. Empirically, the upfront fee in bank loans does not show economy of scale of issue size as the underwriter spread for IPO/SEOs in Eckbo and Masulis (1992), and neither does the U-shape in Altinkilic and Hansen (2000).

Our model shows that penalty-free prepayments induce non-interest credit rationing. This conclusions is independent of the reasons that allow penalty-free prepayments. One question still remains: why not a prepayment penalty but the non-interest terms? Especially, these non-interest terms may incur some deadweight costs. For instance, there are screening, monitoring, and repossession costs associated with collateral (Berger, Frame, and Ioannidou, 2011b), and the upfront fee raises the loan size and hence default risk. A natural question is whether a prepayment penalty can substitute for these non-interest terms to mitigate the prepayment risk. In practice, prepayment penalty is rarely observed for bank loans. We propose three rationales that allow for penalty-free prepayments. First, the lender ex ante loses money only if the borrower refinances the loan with a cheaper one, but prepayment may occur for various reasons. For example, the arrival of new investment opportunities may require the firm to refinance or renegotiate the loan to mitigate a debt-overhang. It is difficult to identify the purpose of the refinancing at the time of prepayment for C&I loans and hence impossible to impose prepayment penalties contingent on the purpose.[7] The flexibility to prepay freely allows the borrower to capture valuable investment opportunities and thus maintains her competitive advantage in product markets. Second, there might be ex-ante hidden risk of borrowers. Intuitively, a prepayment penalty penalizes the good type of borrowers more than the bad type because it is triggered only in good states. To mitigate the adverse selection effect, the equilibrium contract excludes prepayment penalty. Third, prepayment penalty causes the time-inconsistency problem (Kydland and Prescott, 1977). When observing the good signal, the borrower has better outside options and hence more bargaining power, and then can negotiate away the prepayment penalty. In contrast, the upfront fee is paid in advance and hence cannot be eliminated in subsequent negotiations. In an extreme case, if a large prepayment penalty is charged for a small business, the entrepreneur may walk away once he observes the good signal (Hart and Moore, 1994). For this reason, venture capital funding usually includes a "no-compete" provision (Kaplan and Strömberg, 2003).

In the rest of the paper, section 2 describes the model, illustrating how penalty-free prepayments induce non-interest credit rationing and how the use of upfront fees mitigates the prepayment risk. Section 4 proposes testable implications of the model. Section 4 shows empirical evidence. In section 5, we discuss potential reasons that allow for penalty-free prepayments. Finally, section 6 concludes.

2 The Model

2.1 Model Setup

Consider the representative borrower in a competitive credit market and her lender. The lender is a bank or other lending institution. The borrower is a firm with limited liability. Both parties are risk-neutral and their discount rates are normalized to zero. There are three

[7] Prepayments for mortgages occur for two main reasons, family movements and changed market interest rate, which are both easily detected. Prepayment penalty is thus commonly included in subprime loans, frequently contingent on the purpose of refinance.

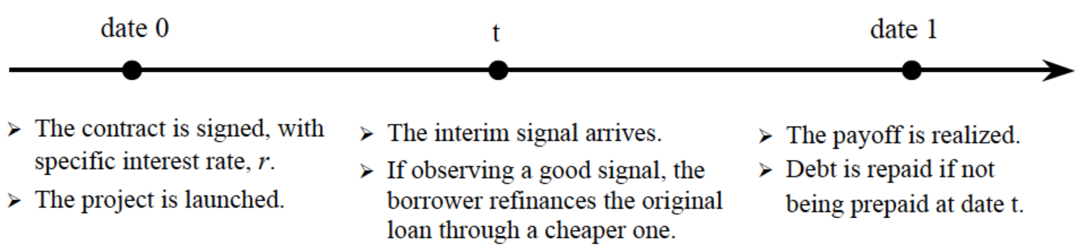
dates, date 0, date 1 and an interim date t ($0 < t < 1$). The borrower is endowed with an investment project that require one unit of initial investment at date 0 and will realize a stochastic payoff at date 1.[8] The payoff is either U if the project succeeds or D if it fails, where $U > 1 > D$. Without loss of generality, assume that the borrower has zero initial net worth so that the project is fully financed by a loan from the lender. The downside payoff, D, reflects collateral of the loan. We only consider the standard debt contract with an interest rate, r, and maturity, 1. That is, at maturity, the borrower either pays $1 + r$ to the lender and keeps $U - 1 - r$ when no default occurs, or loses everything in default.

At date 0, information is symmetric, the loan contract is signed and the borrower starts the investment. Then, at the interim date t *shortly* after the project is started, there arrives a publicly observed but non-verifiable signal concerning the date-1 payoff of the project. Due to non-verifiability, the signal is un-contractible. With probability p, the signal is good and otherwise, the signal is bad. Conditional on the good or bad signal, the probability of success of the project is g or b. In total, the date 1 payoff of the project is U with probability s and D with probability $1 - s$, where $s = pg + (1 - p)b$. The project has positive NPV ex ante but negative NPV following the bad signal, i.e.

$$gU + (1 - g)D > sU + (1 - s)D > 1 > bU + (1 - b)D.$$

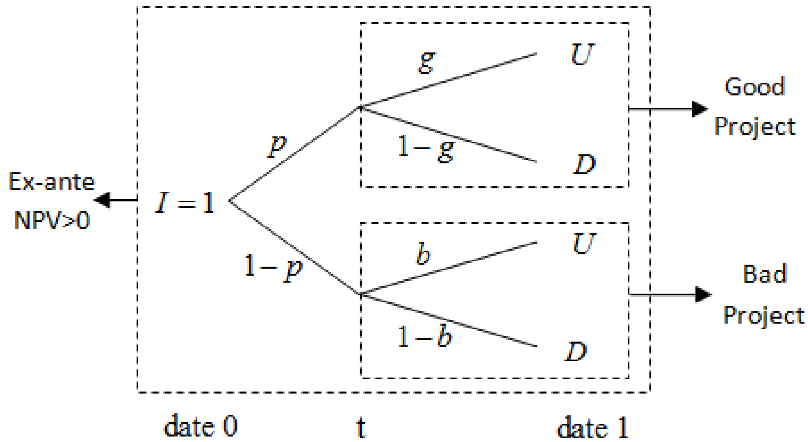
The payoff structure of the project and the timeline of the model are illustrated in the following two figures.

Timeline of the Model



[8] In the paper, "the bank" is interchangeable with "the lender" and "the firms" is interchangeable with "the borrowers".

Payoff Structure of the Investment Project



What we keep in mind here is the situation in which, before the project is started, the two parties agree on the initial contract based on the ex-ante information of the date-1 payoff of the project. After the project starts, the borrower learns more product and market information, which helps her to better know the quality of the investment.[9] This is the case especially for small- and medium-sized businesses.

Conditional on the good signal at date t, the original loan interest rate may not be *fair* any more in a competitive credit market, because the credit quality of the firm is better than the ex-ante expectation. Becoming more creditworthy, the borrower may have incentive to prepay the original loan and to refinance it at a lower price, if the cost of prepayment is less than the benefit. In practice, motivations for exercising the prepayment option are wide-ranging. For mortgages, prepayments are mainly triggered by changes in market interest rates. In contrast, most C&I loans have floating rates, so the impetus to refinance is beyond changes of the market interest rates (Roberts and Sufi, 2009; Roberts, 2010). Roberts and Sufi (2009) find that the accrual of new information concerning credit quality and outside options is a strong predictor of the incidence of renegotiations including those for prepay-

[9]The literature (e.g. the continuous-time models) usually assumes that information concerning future payoffs of the project arrives continuously and steadily, for example, following a pre-specified stochastic process. In our model, much information comes shortly after the investment is launched. This should be a more plausible assumption especially for new projects. In addition, introducing uncertainty after the signal does not change the key model prediction.

ments. We have introduced new information, i.e. the interim signal about changed credit quality, to the model. Further let α be the costs of the borrower to access outside financing options. The refinancing costs reflect time and effort spent by the contracting parties in negotiating the new deal.

2.2 Prepayment and Non-interest Credit Rationing

In this section, we show how penalty-free prepayment induces credit rationing. To start, consider the first-best case when the two contract parties perfectly commit to the original contract regardless of the signal. In a competitive credit market, the lender breaks even ex ante.

$$s(1+r) + (1-s)D = 1 \tag{1}$$

Given that the project has positive NPV ex ante, there is a unique solution to (1),

$$r^* = \frac{1}{s}(1-s)(1-D). \tag{2}$$

With the interest rate, r^*, the project can be financed. Although the lender will have a loss, $(s-b)(1-D)/s$, following the bad signal, she will get a profit, $(g-s)(1-D)/s$, following the good signal. Ex ante, the expected loss equates the expected benefit and the lender breaks even. Therefore, with perfect commitment, the two contract parties are able to use only the loan interest rate to reach an agreement. There is no role for non-price loan instruments or the use of a non-linear pricing approach.

However, perfect commitment is not credible if prepayments are penalty-free. In practice, prepayments for bank loans are mostly penalty-free. Let us first take it as an assumption that the borrower is allowed to prepay the loan at date t freely.[10] When observing the good signal, the borrower prepays the original loan, so long as the refinancing costs are not too high to offset the benefits from the cheaper new loan. In the case with prepayment, the lender cannot capture the interest, r, after t. The participation constraint of the lender

[10] In section 5, we will discuss why prepayment penalties should not be included in C&I loan contracts.

changes to

$$p(tr+1)+(1-p)\big[b(1+r)+(1-b)D\big]=1 \tag{3}$$

The left-hand of (3) includes two parts. The first part is the expected payoff to the lender following the good signal. Being prepaid at date t, the lender gets the accrued interest before t, tr, and the face value of the loan, 1. The second part is the expected payoff of the lender following the bad signal. Rewrite (3) as

$$r=\frac{(1-p)\big\{1-[bU+(1-b)D]\big\}+b(U-1)}{b+pt}. \tag{4}$$

It is not difficult to get $1+r>U$ if

$$t<\frac{(1-p)\{1-[bU+(1-b)D]\}}{p(U-1)}. \tag{5}$$

In the model setup, we assume that the signal arrives *shortly* after the project is started. Now let us further specify "*shortly*" as that (5) is satisfied, so the required payment for the lender to break even is higher than the maximum payoff of the project. Such a high interest rate is not feasible to be implemented because the borrower will terminate the project after observing the bad signal. Suppose that the project will pay off zero if it is abandoned after a bad signal and, in this case, the project is ex-ante not worth investing in, i.e., $p[gU+(1-g)D]<1$. Then, conditional on a positive probability of prepayment, the participation constraint of the lender, (3), is impossible to hold due to the prepayment risk. Increasing the interest rate alone is not sufficient to compensate the lender because, no matter how high the original interest rate is, the lender cannot capture the upside of the project while losing money in the downside. Therefore, conditional on a positive probability of prepayment, the borrower is credit rationed.

Obviously, refinance will not occur if and only if

$$g(1+r)+(1-g)D<1+tr+\alpha. \tag{6}$$

The left-hand side of (6) is the cost of the borrower to keep the original contract, while the right-hand side is the cost to refinance the loan in a competitive credit market. Combine (1) and (6), we get

$$(1 - D)[g - (1 - t)s - t] < s\alpha. \tag{7}$$

This is the necessary condition for refinance or prepayment not to occur. From (7), the larger is α or t, the less likely is refinancing to occur, and so is credit rationing. In this paper, we focus only on the interesting case in which α and t are low enough so that equation (7) is always satisfied. The parameters, s and D, respectively capture default risk and loss-given-default risk, which are the principal credit risk factors according to Standard & Poor's (2009), while α captures competition and efficiency of the credit market.

Proposition 1: *If voluntary prepayment is penalty-free, some risky borrowers with positive NPV projects cannot get the loan they need even if they are willing to increase the interest rate, resulting in credit rationing. In general, more risky borrowers with lower refinancing costs are more likely to be credit rationed.*

Proof: From the above reasoning, the proposition is intermediate.

For borrowers with high observed risk, the lender requires a high interest rate as compensation for potential losses in bad states. At the same time, the high interest rate induces the borrower to refinance the loan after observing the good signal. Thus, the promised payment from the borrower is not credible given that prepayments are penalty-free. Using only the interest rate, the two contracting parties cannot reach an agreement that both avoids prepayments and allows the lender to recoup her investment, so the lender resorts to non-interest credit rationing. From (7), the prepayment risk can be mitigated by increasing s, D, α and t. For example, the borrower may reduce default risk $1 - s$ through certain hedging strategies or reduce loss-in-default by pledging more collateral D to reduce the loan interest rate and to deter prepayments. This is one of the main reasons for which collateral are widely observed in practice.[11]

In the model, no project being financed should be prepaid. It follows that no prepayment could occur in equilibrium. However, prepayments are widely observed in practice as discussed above. It seems that the model prediction here is not consistent with the reality. To see why, note that in our model, the necessary condition for credit rationing to occur is equation (7), in which the lender's loss is required to be sufficiently large following the bad signal. This is not always the case. If the loan size is small comparing to the asset size of the borrower, e.g. when the borrower has substantial initial net worth or collateral, the loan can be fully paid even following the bad signal, and the project can be financed despite penalty-free prepayments. More importantly, prepayments in practice occur for various reasons other than what we discussed above. For example, LBOs, MBOs and takeovers may also trigger firm recapitalization or debt refinance.

2.3 Non-linear Loan Pricing - the Use of Upfront Fees

Prepayments and hence credit rationing are induced by high interest rates. As analyzed in the previous section, it is feasible to reduce the interest rate by pledging more collateral. With a lower interest rate, prepayments are deterred and the project can be financed. However, collateral is limited and insufficient to reduce the interest rate low enough to deter prepayments. In this case, other non-interest instruments may be necessary. For example, the borrower may be required to invest some personal funds, to accept strict debt covenants or to shorten the loan maturity.

In this section, we consider the use of a non-linear pricing approach to mitigate prepayment risk. Our model assumes the signal arrives shortly after the contract is signed. That is, the promised interest will be paid mostly after the signal. Intuitively, if the interest payment is paid before the signal, prepayment can be deterred. From this intuition, the non-linear pricing approach is employed to mitigate prepayment risk. In this approach, the loan price is

[11] Most bank loans are secured in practice. Among more than 86,000 U.S. C&I loans in the DealScan database between 1987 and 2011, around 84% are secured.

split into two parts: the linear part, or the interest, paid annually or quarterly; the non-linear part, or the upfront fee, paid as a lump-sum in advance.

Denote the loan price as R. Assume that, if this price is charged only through interest, prepayment will occur, i.e.

$$g(1+R)+(1-g)D>1+tR+\alpha. \tag{8}$$

Note that (8) is obtained by replacing r to R in (6). As argued earlier, the project cannot be financed due to prepayment risk. Now let consider the non-linear pricing approach. The loan price, R, is split into the upfront fee, y, and the interest rate, r. The loan contract is (r, y) and $R = r + y$. Conditional on a positive probability of prepayment, credit rationing occurs, so any feasible contract should incentive-compatibly deter prepayments, i.e., be renegotiation-proof. This calls for the incentive-compatibility constraint of the borrower when the good signal is observed,

$$g(1+r)(1+y)+(1-g)D\leq(1+tr)(1+y)+\alpha. \tag{9}$$

Note that the face value of the loan is $1 + y$, which consists of the required one unit of initial investment and the upfront fee. The left-hand side of (9) is the borrower's expected payment for the original contract conditional on a good signal, while the right-hand side is that for refinancing the original contract. This equation ensures that the borrower will not prepay the loan following a good signal and hence that the credit rationing problem is solved. Inserting $r = R - y$ into (9), we have

$$y^2+\big[\frac{1-t}{g-t}-R\big]\cdot y+\big[\frac{(1-g)(1-D)+\alpha}{g-t}-R\big]\geq 0 \tag{10}$$

Inequality (10) implies the following proposition:

Proposition 2: *An up-front fee, through reducing the interest rate, can be employed to* *mitigate prepayment risk. The minimum up-front fee, $\hat{y}$, satisfies*

$$\hat{y} = \sqrt{\frac{1}{2}\Big(\frac{1-g}{g-t} - R\Big)^2 + \frac{(1-g)D - \alpha}{g-t}} - \frac{1}{2}\Big(\frac{1-g}{g-t} + 1 - R\Big). \tag{11}$$

Ceteris paribus, $\hat{y}$ is higher with a lower refinancing cost and a higher loan price, i.e. $\frac{\partial \hat{y}}{\partial R} > 0$ *and* $\frac{\partial \hat{y}}{\partial \alpha} < 0$.

Proof: Let $\mathcal{A} \equiv \frac{1-g}{g-t} - R$ and $\mathcal{B} \equiv \frac{(1-g)D-\alpha}{g-t}$. Equation (10) changes to

$$y^2 + (1 + \mathcal{A}) \cdot y + (\mathcal{A} - \mathcal{B}) \geq 0.$$

Since we assume that α and t are sufficiently small, $\mathcal{B} > 0$. For this quadratic inequality, the discriminant is $\Delta = (1+\mathcal{A})^2 - 4(\mathcal{A} - \mathcal{B}) = (1-\mathcal{A})^2 + 4\mathcal{B} > 0$, so the positive solutions satisfy

$$y \geq \hat{y} = \frac{\sqrt{(1-\mathcal{A})^2 + 4\mathcal{B}} - (\mathcal{A} - \mathcal{B})}{2}.$$

From (7), we have $\mathcal{A} - \mathcal{B} < 0$ and hence $\hat{y} > 0$. Also since $\mathcal{B} > 0$, $1 + 2\hat{y} + \mathcal{A} > 0$. Thus,

$$\frac{\partial \hat{y}}{\partial R} = \frac{1 + \hat{y}}{1 + 2\hat{y} + \mathcal{A}} > 0,$$

$$\frac{\partial \hat{y}}{\partial \alpha} = -\frac{1}{(1 + 2\hat{y} + \mathcal{A})(g - t)} < 0.$$

Q.E.D.

To finance the project, $y \geq \hat{y}$ has to be satisfied. By paying the loan price partly through an upfront fee, the required interest rate is reduced and hence the borrower has less incentive to strategically prepay the loan when observing the good signal. The use of upfront fees, like collateral, makes the borrower commit to the original loan contract and hence solves the credit rationing problem. It is obvious that a prepayment penalty has the same effect, so a natural question is why not the prepayment penalty but the upfront fee. Our model will not provide a complete answer to this question, but we will discuss more in section 5 about their differences.

2.4 Performance-sensitive Debt

In our model above, the date-t signal is non-verifiable, so the contract cannot be contingent on the signal. If instead the signal is verifiable, how about the contract? One natural thinking is to finance the project through a contract with maturity, t, for which prepayment is irrelevant. However, (5) in our model setting indicates that any contract with maturity, t, is not feasible because the ex-ante interest rate in (4) would be so high that all future payoffs go to the lender. Therefore, even if the signal is verifiable, the maturity of the feasible contract is still one. In the following, we will show that, although credit rationing cannot be eliminated, the use of performance-sensitive debt (PSD) based on the signal mitigates the prepayment risk.

PSD is one of the widely observed debt features in practice. Manso, Strulovici, and Tchistyi (2010) report that, among bank loans to public firms in the 1995-2005 period in the Thomson Financial's SDC database, approximately 40% include performance-pricing provisions. A traditional bank loan before its maturity is priced using a fixed interest spread over a floating benchmark such as LIBOR or prime. Performance pricing instead has a spread based on the measures of the borrower's performance such as credit rating or debt-to-EBITDA ratio.

To extend our model, we allow the interest rate of the contract is contingent on the interim signal, denoted as (r_g, r_b), where r_g is the interest rate if the signal is good, r_b is for the bad signal, and $r_g \leq r_b < U$. With this contract, two constraints are required to deter prepayments. First, the participation constraint of the lender is

$$p[g(1 + r_g) + (1 - g)D] + (1 - p)[b(1 + r_b) + (1 - b)D] = 1 \tag{12}$$

$$pgr_g + (1 - p)br_b = (1 - s)(1 - D). \tag{13}$$

Since $r_b < U$, (13) implies that

$$pgr_g > (1-s)(1-D) - (1-p)bU. \tag{14}$$

Second, the incentive constraint of the borrower is

$$g(1+r_g) + (1-g)D \leq 1 + tr_g + \alpha. \tag{15}$$

Combining (14) and (15), we have the necessary condition for prepayment not to occur

$$(1-D)[g-(1-t)s-t] < s\alpha + \frac{1}{pg}(g-t)(1-p)b[sU+(1-s)D-1+s]. \tag{16}$$

Without the last part, (16) is the same as (7). Because this last part is always positive, the use of PSD to deter prepayments in (16) requires lower α than the use of straight debt to do so in (7). That is, the use of PSD mitigates the prepayment risk. In nature, concerning detering prepayments, charging an upfront fee works like increasing the refinancing costs. Since PSD reduces prepayment risk comparing to the straight debt, it requires lower level of upfront fees. In sum, we have

Proposition 3: *Comparing with the straight debt, performance-sensitive debt mitigates the prepayment risk and hence reduces the use of upfront fees.*

Intuitively, the reclassification effects due to prepayments make the lender unable to capture the high interest following the good signal, but she has to bear the loss following the bad signal. As long as prepayment occurs, the lender cannot break even. Therefore, any feasible contract must deter prepayments, or reduce the interest rate sufficiently to make refinance following the good signal unprofitable. To reduce the interest rate, the upfront fee or other non-interest instruments are necessary. Note that prepayment is relevant only following the good signal, so the use of non-interest instruments aims to reduce the interest rate with the good signal. When the fixed-rate straight debt is chosen, the non-interest instruments are required to reduce the signal-independent interest rate. However, when PSD is chosen, the non-interest instruments are only required to reduce the interest rate following the good signal. Therefore, performance-pricing reduces the use of non-interest instruments including the upfront fee. It is reported that the use of performance-pricing in debt is used to save refinancing costs (Asquith, Beatty, and Weber, 2005) or to mitigate adverse selection (Manso, Strulovici, and Tchistyi, 2010), etc. Complementary to these findings, we document that the use of performance-pricing substitutes for non-interest instruments.

3 Testable Hypotheses and Empirical Methodology

In practice, unlike bonds which compensate lenders through interest payments alone, bank loans are frequently associated with an upfront fee, which is a one-time fee collected at the closing of the transaction. As part of the loan price, the upfront fee is also a monetary transfer from the borrower to the lender. It is traditionally thought of as compensation for the lender's fixed costs associated with originating the loan. For example, the largest part of the upfront fee for a syndicated loan goes to the lead arranger as compensation for structuring the loan (e.g., Ivashina, 2009). However, the fixed costs can also be charged through interest, so this traditional "fixed-costs" story cannot explain why the fixed costs are charged in the form of an upfront fee. Our model provides an alternative justification of the use of upfront fees. Proposition 2 shows that the upfront fee can be used to mitigate prepayment risk and hence to solve the rationing problem stemming from voluntary prepayments.

3.1 Testable Hypotheses

Our model generates a couple of testable predictions. First, from equation (11), ceteris paribus, loans with higher prices, which are an indicator for the borrower's willingness to prepay, and loans with lower refinancing costs require higher upfront fees. This is our first hypothesis.

Hypothesis I: The size of upfront fees is positively correlated with the loan price and negatively correlated with refinancing costs.

Second, if the use of upfront fees is not associated with any deadweight cost, in our model a borrower with a positive-NPV project can always be financed by accepting a sufficiently high upfront fee, and the upfront fee would have substituted all other non-interest loan terms. However, this is not the case in practice. For example, empirically we observe that collateral may be a more widely-used or more important debt feature than the upfront fee. On the one hand, these other non-interest loan terms such as collateral may be used to compensate the lender for various risks other than the prepayment risk, which are excluded in our model for simplicity. On the other hand, we believe that the use of upfront fees induces deadweight costs. When a borrower needs a loan in practice, she is vey likely liquidity-constrained. Only the other less-expensive instruments have been exhausted, the upfront fee is used to deter prepayments. Empirically, it is convenient to test the use of collateral, so we have the second hypothesis.

Hypothesis II: Secured loans are associated with higher level of upfront fees.

Third, we document in Proposition 3 that PSD mitigates the prepayment risk and hence reduces the use of upfront fees. Intuitively, when the interest rate is contingent on the signal, it can be higher with the bad signal and hence lower with the good signal. Since a lower interest rate with the good signal reduces the possibility of prepayments, PSD mitigates the prepayment risk.

Hypothesis III: Performance-sensitive debt is associated with lower level of upfront fees.

Finally, the financial crisis in 2007-2009 had an influence on the credit markets, e.g. both the level of loan prices and the design of loan contracts. After the crisis occurred in 2007, the economy continues recovering but loan prices are still at historically high level. New issued loans thus have higher probabilities to prepay due to potentially improved credit quality in the future. This makes prepayment risk of even greater concern for the lender. We thus conjecture that the effect on the use of upfront fees from the loan price in Hypothesis I should be more pronounced during and after the financial crisis.

Hypothesis IV: Prepayment risk, or the loan price, has greater influence on the use of upfront fees during and shortly after the period of the 2007-2009 financial crisis.

3.2 Empirical Methodology

Empirically, we employ the following baseline model for our tests,

$$UpfrontFee = \beta_0 + \beta_1 * Price + \beta_2 * RfCost + \beta_3 * Security + \beta_4 * PSD + \Phi * \mathbf{X} + \epsilon. \quad (17)$$

where $Price$ is the loan price, $RfCost$ is the proxy for refinancing costs, $Security$ or PSD is the dummy indicating whether the loan is secured or has performance-pricing feature respectively, and $\mathbf{X}$ is a set of control variables. By expectation, β_1 and β_3 in equation (18) should be positive, β_2 and β_4 should be negative. If the upfront fee is only used as compensation for the fixed costs of the lender, it should not be correlated with the loan price after controlling for other loan characteristics. Therefore, a positive β_1 indicates that the role of the upfront fee goes beyond compensating the lender for fixed costs associated with the loan origination.

To test Hypothesis IV, we include the dummy that is equal to one if the loan is issued in 2007-2011, and its interaction term with the loan price. It is widely accepted that the financial crisis was between 2007 and 2009, but we include year 2010 and 2011. In the two years following the crisis, the economy was recovering but loan prices were still at historically high level (see figure 1). The test is specified as follows

$$UpfrontFee = \beta_0 + \beta_1 * Price + \beta_{crisis} * Crisis + \gamma * Price * Crisis + ... + \Phi * \mathbf{X} + \epsilon. \quad (18)$$

The coefficient γ captures the additional effects of the loan price on the use of upfront fees during and shortly after the financial crisis. We expect γ to be positive.

Our theoretical model and the testable hypotheses are all concerning the use of term loans. Shockley and Thakor (1997) argue that fees can be used as a screening device to sort borrowers. In their model, the good borrowers are more likely to draw down loan commitments, so a commitment fee on the unused balance may screen out the bad borrowers. They provide empirical evidence to support this screening effect of fees, especially commitment fees and utilization fees for credit lines. To exclude such a screening effect, we focus on term loans instead of loan commitments. Term loans are almost always fully drawn down, so the screening effect in the sense of Shockley and Thakor (1997) is trivial.

Loan contract terms are probably jointly determined, so endogeneity is an important issue in our empirical study. The first line of defense against endogeneity is the clear theoretical guidance that our theoretical model provides. **MORE**.......

4 Empirical Evidence

4.1 Data and Sample

The data used to test the hypothesis are taken from the LPC DealScan Database. Each observation corresponds to a separate loan agreement. Most loans in the database are senior, secured and syndications for medium- and large-sized firm borrowers. The database contains the majority of new loans made to public firms in the United States.[12] Since being available in 1987, the database has become more comprehensive over time.

We start with all term loans in DealScan issued by U.S. borrowers between January 1987 and October 2011. Before 1992, there are only a few loans that have available upfront fee information in DealScan, so we first drop loans issued before 1992. We also exclude loans to regulated and financial industries, identified with the 2-digit SIC 40-45, 49, 60-69, and 90-99, and loans with negative interest spread. In the data, there are 20 term loans with an upfront fee over 50 times higher than the all-in-spread, which by definition is the total annual cost of the loan including the loan interest spread and annualized fees. The spread of these loans is only 1 bps, which we think of as data mistakes and hence are dropped from our sample. This results in a total of 26,950 term loans in our full sample, issued by

[12]According to Carey and Nini (2007), Dealscan has information on 50-75% of all U.S. commercial loan volume into the early 1990s, with coverage increasing to 80 -90% from 1992-2002.

10,310 different firms. To obtain borrower accounting information, we merge DealScan with Compustat quarterly data using the link data provided by Chava and Roberts (2008). In our full sample, 15,049 term loans issued by 4,428 different firms have borrower information in Compustat. From the figures, we see that Compustat firms issue term loans more often than the full sample firms. This is because Compustat firms are relatively larger and mostly publicly listed. Finally, to reduce the effect of possibly spurious outliers, we winsorize at the upper and lower one percentiles the continuous ratio variables, including leverage, market-to-book ratio, Profitability, Tangibility and Z-score.

4.2 Variable Description

All variables are defined and described in Table 1. The dependent variable is the upfront fee, measured in basis points (bps). Our main interest is the effect on the size of the upfront fee from the loan price, refinancing costs, security and performance-pricing. As discussed above, it is the high interest rate that induce prepayments and hence credit rationing. Thus, we use the loan interest spread, *Spread*, as the proxy for the loan price.[13] We use dummies, *Syndication* and ITL, which respectively indicate whether the loan is a syndicated loan and an institutional term loan, as proxies for the refinancing costs.[14] Syndication loans have multiple lenders, while ITLs are resold in the secondary markets. Both have complex structure and are considered to be associated with higher refinancing/renegotiation costs compared with traditional bank loans (e.g. Bolton and Scharfstein, 1996; Brunner and Krahnen, 2008). The refinancing costs include bank syndication fees, legal and accounting costs and management time to structuring and syndicating the facilities in general. The dummies for security and performance-pricing are *Security* and *PSD*. To test Hypothesis IV, we construct a dummy variable, *Crisis*, which equals one in 2007-2011, and the interaction term between *Crisis* and *Spread*, $SprCrs = Crisis * Spread$.

[13]In the data, the upfront fee is a part of the all-in-spread, so the two should be positively correlated regardless of whether prepayment risk plays any role in their relationship. For this reason, we choose the interest spread instead of the all-in-spread as the proxy for the loan price.

[14]Institutional term loans (ITLs) include term loan B, C, D, etc.

We control for a set of variables including non-price loan characteristics, borrower characteristics and market conditions, which are commonly used in the empirical literature (e.g. Ivashina, 2009). Non-price loan characteristics include the term loan amount ($logAmount$) in million U.S. \$,[15] maturity ($logMaturity$) in months, loan purpose (*Purpose*),[16] and dummy variables indicating whether the loan is a refinance loan ($Refinance$) or an amendment loan ($Amendment$).[17] These non-price loan characteristics have available data in DealScan. They affect the default risk and the prepayment risk of the loan and hence have impact on the use of upfront fees.[18] Usually, these non-price features of the loan are fixed before the syndication process. This justifies the use of the non-price loan characteristics as control variables (Ivashina, 2009).

Borrower characteristics include firm size ($logAssets$) in million U.S. \$, book leverage ($Leverage$), borrower's investment opportunities proxied by market-to-book ratio (Q), profitability (*Proftability*), and tangibility (*Tangbility*).[19] We also use total assets from Compustat to measure firm size. Following Roberts (2010), the borrower characteristics are defined as follows. Book leverage is the total debt divided by total assets, where total assets use the item, "Total Assets", in Compustat and total debt is the sum of "Long-Term Debt" and "Debt in Current Liabilities". Market-to-book ratio is defined as the sum of the market value of equity and total debt divided by total assets. It measures the future investment opportunities, which should have a negative effect on the use of upfront fees. Profitability is measured by re-

[15]A loan deal in DealScan usually includes multiple tranches, for example, term loans (term loan A, B, C...) and revolving credit lines. Although our tests concern only term loans, the size of the deal including both term loans and revolvers may also have impact on the default risk of the loan. In all specifications, when we include the deal size ($logDeal$) as a control variable, our results have no change.

[16]Following Carey, Post, and Sharp (1998), loan purposes are categorized into four groups: general purposes ("working capital" and "general corporate purpose"), recapitalization ("debt repayment/consolidation", "recapitalization", and "debtor-in-possession loan"), acquisition ("general or specific acquisition program" and "LBO loans") and others.

[17]Most loans in Dealscan are not the initial originated loan but refinanced or amended loans.

[18]Seniority is also an important loan characteristic. In DealScan, almost all loans are senior (more than 99.7%), so we do not include seniority as a control. Robustness check (not reported in the paper) shows that seniority has no any substantial influence on the results.

[19]We also run regressions (results not reported in the paper) using credit rating score ($Score$) as the measure of borrower risk. Credit rating score is a discrete variable, equaling 1 for S&P rating "AAA", 2 for "AA+", 3 for "AA", and so on. We lose a large number of observations, but the results have no substantial change.

turn on assets, equaling to "Operating Income Before Depreciation" divided by total assets. Tangibility is the ratio of net PP&E to total assets.

Finally, we include the year dummies and industry dummies to control for market conditions. There are 63 industry dummies using the 2-digit SIC codes excluding regulated and financial industries.

4.3 Summary Statistics and Upfront fees in DealScan

The summary statistics of the variables are given in table 2. Panel A of the table shows the summary statistics for the full sample, while panel B, C and D show those for observations with non-missing upfront fees, non-missing loan characteristics and non-missing loan and firm characteristics, respectively. From Panel A, around 16% of the observations in our full sample include an upfront fee (4,876 out of 26,950). The mean and median are 93.8 bps and 62.5 bps respectively. The interest spread of term loans in the full sample has an average of 318 bps and a median of 300 bps. Conditional on available upfront fee information in DealScan, the upfront fee is around 31% of the spread of the loan, indicating that the upfront fee is an substantial part of the loan price in addition to the interest.

The table shows that our full sample has a large number of missing values. The subsample with non-missing loan and firm characteristics (with merged data between DealScan and Compustat) has only 877 observations. This is mainly due to two reasons. First, a majority of loans in DealScan have missing upfront fee information (84%). Second, more than half of firms in DealScan are not included in the Compustat database. We know that Compustat is mainly for large and public firms, but the reasons for missing upfront fees in DealScan is not obvious. According to the LPC customer service, when no data was collected or provided for the upfront fee item, LPC leaves it as "N/A". Discussions with practical people in commercial banks suggest that most loans have an upfront fee, but typically the upfront fee is confidential and is signed in the fee letter separated from the loan contract in practice. Being aware of the data quality of DealScan concerning the upfront fee, we conjecture that the observations with missing upfront fee information may consist of three types: random missing values, self-selected hidden values, and zero-upfront fees.

Comparing the four panels of table 2, we see that the subsamples in Panel B, C and D have higher mean spreads (339bps, 354bps, and 333bps) than the full sample (318bps). Also the subsamples include less syndicated loans than the full sample (82%, 84% and 84% v.s. 93%) and more PSD (26%, 35% and 42% v.s. 19%). If the missing values of the upfront fee variable is zero, the above differences between the subsamples and the full sample are consistent with our model predictions that the use of upfront fee is increasing in the loan price and loan security, but decreasing with refinancing costs and performance-pricing. This will also be confirmed in table 3 and the results when we run the regressions taking the missing upfront fees as zero in the robustness checks of the next section.

Table 3 shows the differences in means of loan and firm characteristics between the group of loans with non-missing upfront fee information and those with missing upfront fee information. The characteristics are mostly significantly different across the two groups. For example, loans with non-missing upfront fee information have higher interest spread, and are less likely to be syndicated but more likely to be secured, PSD, refinance and amendment loans. The borrowers of loans with non-missing upfront fee are more likely to be public, and have slightly smaller asset size and lower profitability. These differences indicate that there could be a selection problem in the data. For this reason, we will test our hypotheses also using a Heckman selection model.

Figure 1 and 2 show the time variation of the means of our interested variables. From figure 1, we see that the upfront fee and the interest spread change overtime in similar patterns. In most time, the upfront fee is about one third of the interest spread, but the ratio increases to over 40% during the financial crisis. Figure 2 shows that more and more loans in our full sample are syndicated over time, coinciding with the boom of leveraged loan markets. The proportion of institutional term loans also increases over time except the drop during the financial crisis. PSD is popular in the mid-1990s, but its use exhibits a decreasing trend after 1997. The proportion of secured loans, except a drop during the crisis, is pretty stable.

4.4 Tests and Results

4.4.1 Upfront Fees in Term Loans

Table 4 presents results of regressions on the upfront fee of term loans. For every specification, we employ both OLS and Heckman selection models, control for the year and 2-digit industry fixed effects, and cluster the standard errors at the firm level. The Heckman selection model is used to mitigate the potential self-selection bias of the upfront fee observations in DealScan. We use the dummy, *Public*, as an instrument in the selection equation. We expect that public firms are more likely to release the upfront fee information due to SEC requirements than private firms, while the use of upfront fees should not have significant difference between public and private firms. To justify *Public* as the instrument, we include *Public* as a control in OLS regressions and find that it is never significant in any specification. In DealScan, loans to public firms have lower level of upfront fees (85bps) than private firms (100bps), but this is because loans to public firms have lower spread (293bps v.s. 331bps) and more likely to be PSD (31% v.s. 12%). Between loans issued to public firms and private firms who are included in Compustat, there is no significant difference in the use of upfront fees.[20]

Table 4 shows that the upfront fee is increasing in the loan spread. In all specifications, a 100bps increase in the interest spread is on average associated with an over 15bps higher upfront fee. This finding is consistent with our model prediction in Proposition 2 that the upfront fee can be used to reduce the high interest rate of a loan and hence to deter prepayments. It also indicates that the upfront fee is not used only to compensate the lender for fixed costs. As expected, institutional loans (ITLs) have lower level of upfront fees. We interpret this as that ITLs are sold in the secondary markets, so renegotiations and refinance are both more time- and effort-consuming. In general, the upfront fees are higher for secured loans but lower for performance-sensitive loans. We conjecture that the upfront

[20]For the 3,499 loans that have both the upfront fee information in DealScan and the accounting information in Compustat, 2,040 are issued by public firms and 1,459 by private firms. The mean upfront fee is 84.1bps for the former and 87.5 for the latter. The two means are not significantly different (t-value, 1.16).

fee is the "residual" instrument, used to deter prepayments only when the other non-interest instruments such as collateral have been exhausted. The higher upfront fees in secured loans confirm this conjecture. Among all the variables that we are interested in, only *Syndication* has no significant effect on the use of upfront fees. We will show later that syndicated loans are more likely include non-missing upfront fee information in DealScan so, if missing values are likely to be zeros, syndication has a negative effect on the use of upfront fees.

Concerning the use of upfront fees during and after the financial crisis, the loan spread as predicted has a significantly greater impact on the size of upfront fees in 2007-2011. In column (3)-(4) of table 4, the interaction term between loan spread and financial crisis is significantly positive. The effect from the loan spread on the use of upfront fees is almost doubled during and after the financial crisis. Column (7)-(8) show similar results, with the effect even tripling that in normal periods. Beyersdorf and Palacios (2008) report that during and after the 2007-2009 financial crisis, some C&I loans have call provisions or have original issue discounts (OIDs) in pricing, i.e. sold below par.[21] The discount from par in the new issue market is offered as a spread enhancement (Standard&Poor's, 2009). In nature, the OID plays a similar role to an upfront fee in deterring prepayments.

A couple of other control variables have significant coefficients. For example, loan amount and maturity in general increase the use of upfront fees, while borrower asset size reduces it. A larger loan size are more likely to be prepaid, because the interest is linear in the loan size while refinancing costs are probably not. It is also reasonable that the use of upfront fees is decreasing in asset size because a larger asset size makes the loan size relatively smaller. However, it seems a contradiction that the upfront fee is negatively correlated with maturity. Logically, loans with a longer maturity are more possible to be prepaid before the due date, so higher upfront fees are expected. In the data, syndicated and/or institutional loans have longer maturities, so the negative effect from maturity on the upfront fee could be due to

[21] Denis Beyersdorf and Luis Palacios, 2008, *Overview of DealScan Data, a Joint Presentation by Thomson Reuters and WRDS*, available at `https://wrds-web.wharton.upenn.edu/wrds/ds/dealscan/company/index.cfm`.

the higher refinancing costs of these loans.

4.4.2 Amending Data Problem for Deals with Multiple Tranches

A syndicated deal in DealScan may include multiple tranches including term loans or revolvers. A revolver is a line of credit where the customer pays a commitment fee and is then allowed to use the funds when needed. It is typically used to provide liquidity for a company's day-to-day operations. Except upfront fees, most of the loan characteristics within a deal such as amount, spread and maturity are specified at tranche levels. In DealScan, if an upfront fee is charged on the entire amount of the deal including both a term loans and a revolver, LPC puts the fee only on the revolver. Therefore, our previous results based only on term loans may be biased, if many term loans miss the upfront fee information because they are issued together with revolvers.

To identify such an effect, we check in DealScan whether a large number/proportion of term loans with missing upfront fee information are issued with a revolver credit line that includes an upfront fee. There are 814 this type of term loans. This is a neglect able comparing to the number of term loans with non-missing upfront fee information (4,876). We then take the upfront fees of the credit line as that for the term loan in these deals, and obtain in total 5,690 observations with non-missing upfront fee. We run all the regression of table 4 and the results are shown in table 5. There is no any change concerning our previous conclusions.

Furthermore, we include both term loans and revolver credit lines in the regressions. The full sample now has 26,950 term loans and 43,156 revolver credit lines. All revolver credit lines are specified as non-ITLs. The results, reported in table 6, again have no change.

4.4.3 Further Robustness Checks

We pursue a couple of further robustness checks. First, there is no zero upfront fee in DealScan, so the missing values of the upfront fee must consist of some zeros. As table 3 shows that the loans with missing upfront fee information are significantly different from the loans with non-missing upfront fee information. We attribute this difference as self-selection of borrowers to release the upfront fee information. It is also possible that the differences are because the loans with missing upfront fee information have zero upfront fees. According to the LPC customer service, when no data was collected or provided for the upfront fee item, LPC leaves it as "N/A". This makes the possibility even higher. Therefore, we take all missing values of the upfront fee as zero and check the robustness of our previous results. Since the upfront fee is truncated at zero, we employ both OLS and Tobit models. The results are shown in table 7. Compared with those in the previous tables, the coefficients are barely changed except that *Syndication* now has a significantly negative coefficient. If the missing values of the upfront fee include many zeros, this negative effect confirms our model prediction that refinancing costs reduce the use of upfront fees. Second, we control for 3-digit SIC industry fixed effects (table 8) and find that our results are not driven by the industry classification.

5 Why Prepayments Are Penalty-free?

So far, we document that non-interest terms are necessary to deter prepayments. However, the use of these terms, e.g. collateral, may trigger additional costs (see e.g. Berger, Frame, and Ioannidou, 2011b). First, if the lender and the borrower have divergent valuations of the pledged assets, there is a deadweight loss due to the inefficient delivery of collateral in default (Barro, 1976). Second, the borrower loses the full control of the pledged assets to the lender, and may not be able to make the best use of these assets. Finally, the lender bears costs of screening, monitoring and repossessing the pledged assets. Similarly, the use of upfront fees for liquidity-constrained firms may be costly, as we argued earlier.

It is natural to think of a prepayment penalty as the substitute for the non-interest terms to deter prepayments. In practice, however, most private debt agreements do not carry any prepayment penalty, while non-price instruments are widely observed debt features. This suggests that keeping the option of penalty-free prepayments for the borrower in C&I loans must be a rational choice of the contract parties. To our knowledge, no other paper discusses this issue in the literature. We make the first attempt to fill the gap in this section. It is worth noting that the main predictions of the model are materially independent of the reasons for penalty-free prepayments.

5.1 Financial Flexibility

Beyond the simple purpose of replacing the current loan by a cheaper loan, prepayments may occur for many other reasons, e.g. the arrival of new investment opportunities and takeovers, or the change of the previous business plan adapting to the uncertain competitive environment. Therefore, although a penalty can eliminate prepayment risk due to the borrower fleeing to cheaper funding, it imposes additional costs on the borrower to make new investments and to modify business plans. One could consider a penalty contingent on the purpose of prepayments. This is the case in mortgage markets, where refinancing due to home movements can be easily separated from those due to changes of the market interest rate. However, it is generally difficult and costly for the lender to distinguish the purpose of prepayments for C&I loans. Consequently, to avoid inappropriately penalizing refinancing with other purposes than fleeing to cheaper funding, the optimal choice is to exclude prepayment penalty in the contract ex ante.

The option of penalty-free prepayments enables the borrower to mitigate debt overhang (Myers, 1977) and risk-shifting (Jensen and Meckling, 1976). If prepayment is forbidden or charged with high penalties, the borrower may have to pass up some positive NPV projects that reduce borrower risk or choose only the risky projects to undertake. Over time, risk-shifting also leaves the lender with only risky borrowers. Instead, non-price instruments such as collateral mitigate risk-shifting.

Given that both non-interest terms and prepayment penalties are costly, there is a trade-off between the two dimensions of financial flexibility: callability and constraints on the non-price loan instruments. The option to call the loan freely at any time has important value for firms with large growth opportunities and firms facing intensive competition. For these firms, non-pricing credit rationing is a way to grant the borrower the call option, while compensating the lender with seniority, security, restrictive covenants, etc. For the largest firms with few investment opportunities and in less competitive industries, the gain from the option to prepay freely cannot offset the costs from the restrictions on the non-price instruments. For these firms, it is optimal to give up this option in favor of relaxing some restrictions on the non-price instruments and instead rely on bond markets as a main funding source. Consistent with the above argument, the following table, *Features of C&I Bank Loans and Bonds*, compares some features of C&I loans and bonds. C&I loan borrowers hold the free call option while accepting more strict constraints on non-interest terms. In contrast, bond issuers give up the free call option to relax constraints on these terms.

Features of C&I Bank Loans and Bonds

		C&I Loans	**Bonds**
Borrower Size		all sizes	large
Callability		call freely	no call or call with premium
Non-price Instruments	Pricing	non-linear	linear
	Rate	floating rate	fixed rate
	Payments	amortizing	non-amortizing
	Seniority	senior	not senior
	Security	secured	unsecured
	Covenants	more	less
	Maturity	shorter	longer

5.2 Adverse Selection

Adverse selection could be another reason to allow for penalty-free prepayments. The credit rationing model in Section 2 assumes ex-ante symmetric information. If there are two types of borrowers and the good type has a high probability to receive a good signal than the bad type, intuitively prepayment penalty penalizes the good type more than the bad type because it triggers only in the good state, while collateral penalizes the bad type more than the good type because it delivers only in default. Therefore, prepayment penalty in a loan contract results in adverse selection, but collateral does not. In competitive credit markets, any contract that pools different risks should exclude prepayment penalty.

5.3 Time Inconsistency

By construction, the upfront fee reduces the interest payment similar to a prepayment penalty paid in advance. What is the difference for the borrower between paying the "penalty" at the time of prepayment and paying in advance? One important reason is that prepayment penalty induces the time-inconsistency problem in the sense that ex-ante optimal contract may not be optimal ex post (Kydland and Prescott, 1977). When the contract is signed at date 0, the future payoff of the project is uncertain so that the risk premium including both fees and interest is *forwarding-lookingly* fair. In contrast, when the signal arrives, the borrower has better outside options and hence more bargain power. If the lender rejects prepayments or renegotiations and still forces the borrower to pay the currently-unfair interest, the lender might lose a good reputation or destroy the good borrower-lender relationship. In an extreme case for small businesses, if the borrower is denied to prepay the loan, she might choose to walk away (e.g. Hart and Moore, 1994). This may force the lender to accept prepayments ex post and then induce credit rationing ex ante for borrowers with severe hold-up problems. The influence of human capital is larger for small firms and firms with high R&D investment, especially start-ups. For this reason, venture capital widely uses non-compete and vesting provisions to mitigate hold-up problems (e.g. Kaplan and Strömberg, 2003).

6 Conclusion

This paper links the option of penalty-free prepayments and credit rationing in C&I loan markets. Given that the borrower keeps the option to prepay the loan without penalty, the lender cannot recoup her investment because voluntary prepayments limit her gains from the upside of the investment project. If the downside NPV of the project is negative, ex ante the two contract parties are not able to to sign a mutually beneficial loan agreement by altering the interest rate alone, resulting in credit rationing. To finance the investment, the loan interest rate must be low enough to incentive-compatibly deter prepayments. One way to reduce the interest rate is to use non-price instruments such as collateral. For borrowers with higher observed risk or lower refinancing costs, the minimum requirement of collateral is higher. This inference is consistent with extant empirical evidence (e.g. Berger, Frame, and Ioannidou, 2011a,b). Another way is to employ a non-linear pricing approach, in which the price of the loan is split into two parts, the interest rate and a lump-sum upfront fee. The minimum required fee is higher for loans with higher prepayment risk and lower refinancing costs. Using a sample of over 22,950 loans issued by U.S. borrowers between 1992 and 2011, we provide evidence supporting this prediction. First, loans with higher spreads are associated with higher upfront fees. Second, loans with higher refinancing costs, syndication loans (vs. traditional bank loans) and/or institutional term loans (v.s. non-ITLs), are associated with lower upfront fees. Third, the upfront fee is higher for secured loans and lower for performance-sentitive loans.

Non-price instruments and the upfront fee induce deadweight costs. One may thank that prepayment penalty could be a feasible substitute. In practice, however, prepayment exclusions and prepayment penalties are extremely rare. We argue that the main rationale to allow penalty-free prepayments is to maintain the borrower's financial flexibility to capture future investment opportunities, to mitigate adverse selection, and to avoid the time-inconsistency problem in financial contracting.

In general, voluntary prepayments in C&I loan markets have attracted little attention in the prior literature. We make a first step to explain why prepayments are penalty-free for C&I loans and to identify the role of collateral and fees in deterring prepayments.

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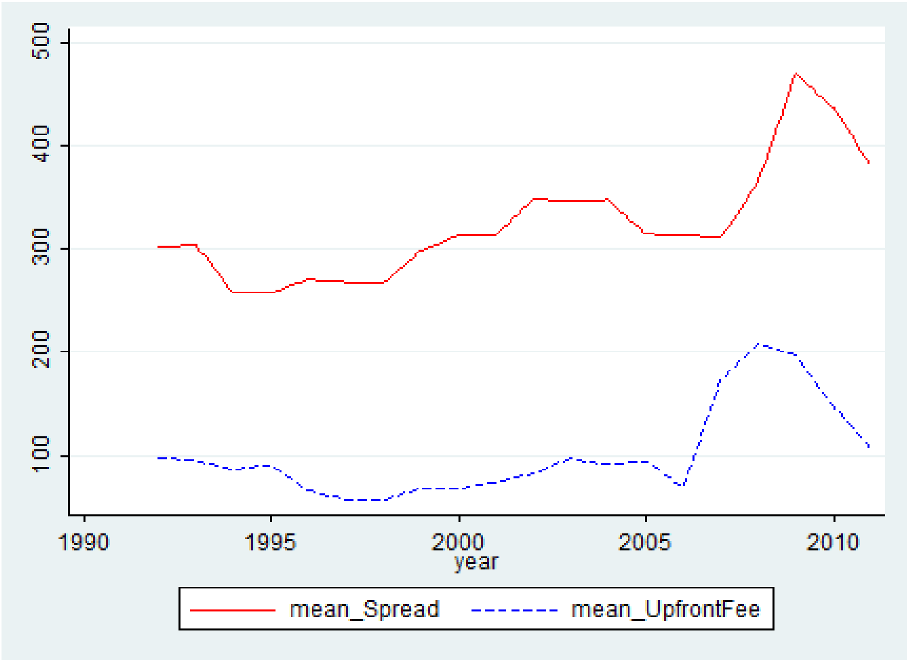

Figure 1: The Interest Spread and Upfront Fees Overtime

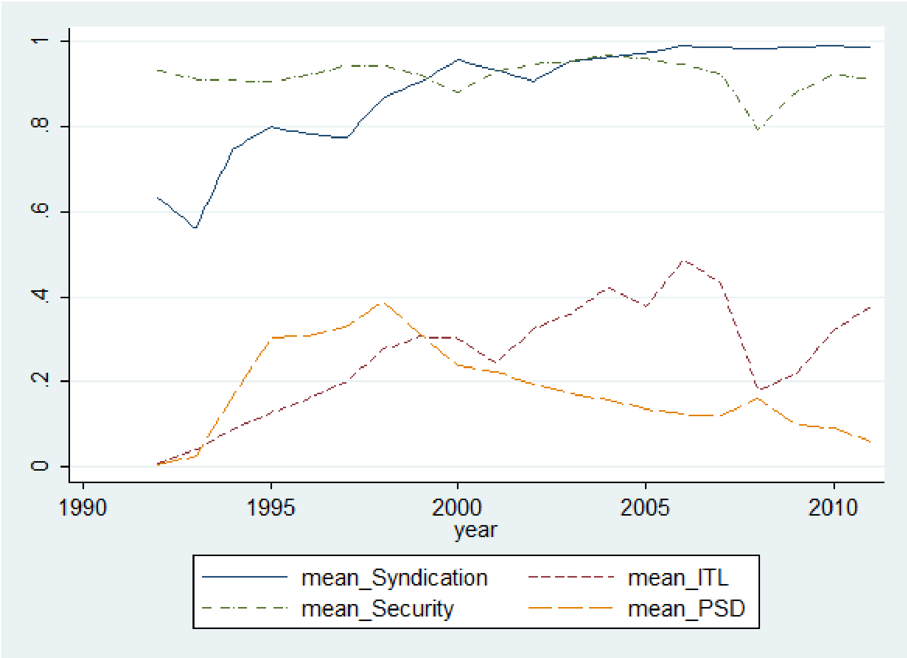

Figure 2: Some Loan Characteristics Overtime

Table 1: Variable Description

The table shows the notation and definition of variables used in our analysis. The variables are classified into four categories: dependent variable, loan characteristics, borrower characteristics, and market conditions.

Items	Description
Dependent Variable	
UpfrontFee	Upfront fee measured in bps
Loan Characteristics	
Spread	Interest spread or margin of the term loan, measured in bps
AIS	The loan price or all-in-spread drawn measured in bps
Syndication	Dummy =1 for syndicated loans
ITL	Dummy =1 for institutional term loans (ITLs)
Security	Dummy =1 for secured loans
PSD	Dummy =1 for performance-sensitive debt (loans with performance-pricing)
Crisis	Dummy =1 in the period from 2007 to 2011
logAmount	The logarithm of the tranche size measured in U.S.
logMaturity	The logarithm of the tranche maturity measured in months
Refinance	Dummy =1 for refinance loans
Amend	Dummy =1 for loans with amendments
Purpose	Dummies for the four loan purposes, including general purposes (working capital and general corporate purposes), recapitalization (debt repayment/consolidation, recapitalization, and debtor-in-possession loans), acquisition (general or specific acquisition program and LBO loans), and Others.
Borrower Characteristics	
Public	Dummy =1 for listed borrowers
logAssets	The natural logarithm of Total Assets measured in million U.S. dollar, i.e. $log(atq)$
Q	Market value/Total Assets, i.e. $(atq - (atq - ltq + txditcq) + (prccq * cshoq))/atq$
Leverage	Total Liabilities/Total Assets, i.e. $(dlcq + dlttq)/atq$
Profitability	EBITDA/Total Assets, i.e. $oibdpq/atq$
Tangibility	PP&E/Total Assets, i.e. $ppentq/atq$
CashFlowRisk	Variance of EBITDA calculated using observations in the past eight quarters in Compustat, divided by Total Assets.
Z-Score	The Altman's Z-Score $= 1.2 * ((actq - lctq)/atq) + 1.4 * (req/atq) + 3.3 * (piq/atq) + 0.6 * ((prccq * cshoq)/ltq) + 0.999 * (saleq/atq)$
Market Conditions	
Year	Year dummy
Industry	Industry dummy

Table 2: Summary Statistics

The table presents the summary statistics for all the variables in Table 1. Panel A is for the full sample, while B,C and D are for the sample with observations that have non-missing upfront fee, no any missing loan characteristics and no any missing loan and firm characteristics, respectively.

Variable	Mean	p25	p50	p75	SD	N
Panel A: All loans in our full sample						
UpfrontFee	93.75	37.50	62.50	100.00	91.28	4,876
Spread	317.96	225.00	300.00	375.00	169.92	23,404
Syndication	0.91	1.00	1.00	1.00	0.28	26,494
ITL	0.30	0.00	0.00	1.00	0.46	26,950
Security	0.93	1.00	1.00	1.00	0.26	15,203
PSD	0.19	0.00	0.00	0.00	0.39	26,950
logAmount	17.64	16.62	17.73	18.83	1.69	26,610
logMaurity	3.90	3.58	4.09	4.28	0.67	23,815
Refinance	0.72	0.00	1.00	1.00	0.45	16,119
Amendment	0.10	0.00	0.00	0.00	0.30	25,803
Public	0.35	0.00	0.00	1.00	0.48	26,950
logAssets	17.64	16.27	17.66	18.93	1.94	11,469
Leverage	0.45	0.25	0.41	0.59	0.31	11,066
Q	1.69	1.06	1.35	1.83	1.54	9,032
Profitability	0.03	0.02	0.03	0.05	0.05	10,551
Tangibility	0.31	0.13	0.26	0.44	0.23	11,419
CashFlowRisk	0.02	0.01	0.01	0.02	0.10	10,973
ZScore	1.71	0.51	1.22	2.17	4.86	9,152
Panel B: No missing values in the upfront fee						
UpfrontFee	93.75	37.50	62.50	100.00	91.28	4,876
Spread	338.68	237.50	305.00	405.00	165.91	4,363
Syndication	0.82	1.00	1.00	1.00	0.39	4,755
ITL	0.30	0.00	0.00	1.00	0.46	4,876
Security	0.94	1.00	1.00	1.00	0.23	3,853
PSD	0.26	0.00	0.00	1.00	0.44	4,876
logAmount	17.65	16.30	17.99	19.11	1.98	4,826
logMaurity	3.92	3.58	4.09	4.29	0.66	4,438
Refinance	0.77	1.00	1.00	1.00	0.42	2,825
Amendment	0.12	0.00	0.00	0.00	0.32	4,538
Public	0.43	0.00	0.00	1.00	0.50	4,876
logAssets	17.28	15.72	17.24	18.69	1.97	2,748
Leverage	0.44	0.23	0.41	0.59	0.31	2,643
Q	1.73	1.07	1.36	1.87	1.57	2,185
Profitability	0.02	0.01	0.03	0.04	0.06	2,516
Tangibility	0.32	0.13	0.26	0.45	0.23	2,739
CashFlowRisk	0.02	0.01	0.01	0.02	0.02	2,617
ZScore	1.76	0.44	1.11	2.11	4.75	2,215

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Variable	Mean	p25	p50	p75	SD	N
Panel C: No missing values in loan characteristics						
UpfrontFee	85.62	33.33	61.72	100.00	87.96	1,975
Spread	353.78	250.00	325.00	405.00	168.53	1,975
Syndication	0.84	1.00	1.00	1.00	0.36	1,975
ITL	0.31	0.00	0.00	1.00	0.46	1,975
Security	0.94	1.00	1.00	1.00	0.23	1,975
PSD	0.35	0.00	0.00	1.00	0.48	1,975
logAmount	17.73	16.22	18.13	19.34	2.07	1,975
logMaurity	3.91	3.58	4.09	4.28	0.64	1,975
Refinance	0.78	1.00	1.00	1.00	0.41	1,975
Amendment	0.19	0.00	0.00	0.00	0.39	1,975
Public	0.52	0.00	1.00	1.00	0.50	1,975
logAssets	17.48	15.99	17.64	18.91	1.94	1,293
Leverage	0.45	0.25	0.41	0.58	0.30	1,248
Q	1.69	1.00	1.25	1.75	1.93	1,025
Profitability	0.02	0.01	0.03	0.04	0.06	1,184
Tangibility	0.31	0.13	0.25	0.45	0.23	1,290
CashFlowRisk	0.02	0.01	0.01	0.02	0.02	1,240
ZScore	1.50	0.35	0.99	1.85	4.39	1,057
Panel D: No missing values in loan and borrower characteristics						
UpfrontFee	77.27	25.00	50.00	100.00	76.34	874
Spread	333.06	225.00	300.00	400.00	163.87	874
Syndication	0.84	1.00	1.00	1.00	0.37	874
ITL	0.26	0.00	0.00	1.00	0.44	874
Security	0.95	1.00	1.00	1.00	0.23	874
PSD	0.42	0.00	0.00	1.00	0.49	874
logAmount	17.50	15.89	17.73	19.23	2.13	874
logMaurity	3.86	3.58	4.09	4.28	0.67	874
Refinance	0.82	1.00	1.00	1.00	0.39	874
Amendment	0.23	0.00	0.00	0.00	0.42	874
Public	0.73	0.00	1.00	1.00	0.45	874
logAssets	17.34	15.87	17.47	18.72	1.89	874
Leverage	0.41	0.24	0.38	0.54	0.28	874
Q	1.69	1.01	1.27	1.76	1.90	874
Profitability	0.02	0.01	0.02	0.04	0.06	874
Tangibility	0.30	0.12	0.23	0.45	0.23	874
CashFlowRisk	0.02	0.01	0.01	0.02	0.03	874
ZScore	1.48	0.43	1.05	1.92	4.35	874

Table 3: Differences in Firm and Loan Characteristics: non-missing v.s. missing upfront fees

The table presents average firm and loan characteristics for loans with non-missing upfront fee information and those with missing upfront fee information. Variables are described in Table 1. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Variable	**Non-missing**		**Missing**		**Difference**
	N	**Mean**	**N**	**Mean**	
Spread	4,362	339	19,042	313	26***
Syndication	4,753	0.82	21,741	0.93	-0.11***
ITL	4,874	0.30	22,076	0.30	0.00
Security	3,851	0.94	11,352	0.92	0.02***
PSD	4,874	0.26	22,076	0.17	0.09***
logAmount	4,824	17.7	21,786	17.6	0.01
logMaturity	4,473	3.92	19,378	3.89	0.03**
Refinance	2,824	0.77	13,295	0.71	0.06***
Amendment	4,536	0.12	21,267	0.10	0.02***
Pubic	4,874	0.43	22,076	0.33	0.10***
logAssets	2,747	17.3	8,722	17.8	-0.05***
Leverage	2,642	0.44	8,424	0.45	-0.01
Q	2,184	1.73	6,848	1.68	0.05
Profitability	2,515	0.02	8,036	0.03	-0.01***
Tangibility	2,738	0.32	8,681	0.30	0.02**
CashFlowRisk	2,616	0.02	8,357	0.02	0.00
ZScore	2,214	1.77	6,938	0.74	1.03

Table 4: The Use of Upfront Fees in Term Loans

The table presents results of regressions on the upfront fee of term loans. The columns differ in the variables included as well as the empirical model employed, as indicated by the column headers. All the variables are described in Table 1, and all the regressions control for the year and 2-digit industry fixed effects. Standard errors are clustered at the firm level and corrected for heteroskedasticity. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, and t-values are shown in parentheses.

	(1) OLS	(2) Heckman	(3) OLS	(4) Heckman	(5) OLS	(6) Heckman	(7) OLS	(8) Heckman
Spread	0.183***	0.222***	0.150***	0.172***	0.193***	0.250***	0.146***	0.187**
	(9.81)	(5.14)	(9.18)	(5.26)	(7.54)	(3.11)	(6.70)	(2.53)
Syndication	5.887	-28.093	2.852	-23.038	12.037*	-56.152	7.212	-72.831
	(0.97)	(-0.77)	(0.48)	(-0.68)	(1.65)	(-0.70)	(1.02)	(-0.78)
ITL	-14.800***	-17.724***	-11.932***	-13.842**	-22.117***	-31.121	-16.850***	-25.602
	(-3.20)	(-2.92)	(-2.60)	(-2.53)	(-3.39)	(-1.50)	(-2.70)	(-1.12)
Security	21.900***	43.166*	21.609***	37.246*	32.895***	122.134	28.081***	128.599
	(3.02)	(1.80)	(3.05)	(1.72)	(3.68)	(1.17)	(3.60)	(1.10)
PSD	-9.260**	-8.986*	-8.730**	-8.416*	-7.469	-9.869	-5.392	-7.055
	(-2.40)	(-1.81)	(-2.26)	(-1.83)	(-1.47)	(-0.61)	(-1.06)	(-0.38)
Crisis			-	-40.311*			-	-62.362
			-	(-1.92)			-	(-0.61)
Sprd_Crisis			0.130**	0.155***			0.281***	0.404**
			(2.37)	(3.62)			(3.32)	(2.09)
logAmount	4.820***	9.903*	4.681***	8.419*	11.221***	18.205	10.524***	18.102
	(3.25)	(1.78)	(3.18)	(1.68)	(3.01)	(1.64)	(2.99)	(1.47)
logMaturity	-6.080*	-4.056	-7.454**	-6.115*	-8.591	7.184	-11.418**	5.552
	(-1.66)	(-0.98)	(-2.00)	(-1.65)	(-1.62)	(0.34)	(-2.15)	(0.24)
Refinance	-7.013	-13.948	-7.247	-12.456	-2.234	-34.631	-1.932	-38.436
	(-1.05)	(-1.50)	(-1.08)	(-1.45)	(-0.28)	(-0.82)	(-0.26)	(-0.81)
Amendment	-4.287	-4.338	-4.105	-3.987	-1.415	9.521	-2.163	10.896
	(-0.91)	(-0.79)	(-0.88)	(-0.78)	(-0.24)	(0.44)	(-0.36)	(0.44)
logAssets					-6.975**	-9.405	-6.360*	-8.996
					(-2.05)	(-1.09)	(-1.89)	(-0.92)
Leverage					-7.041	-18.322	-5.099	-18.060
					(-0.62)	(-0.54)	(-0.46)	(-0.47)
Q					-1.973	-1.543	-2.063	-1.424
					(-1.05)	(-0.27)	(-1.09)	(-0.22)
Profitability					-19.324	-412.089	-29.215	-471.498
					(-0.31)	(-0.86)	(-0.45)	(-0.88)
Tangibility					-0.790	-30.143	-4.465	-37.727
					(-0.05)	(-0.58)	(-0.32)	(-0.63)
CashFlowRisk					-55.890	-677.414	-27.905	-722.703
					(-0.40)	(-0.84)	(-0.19)	(-0.80)
ZScore					0.189	-0.094	0.230	-0.124
					(0.42)	(-0.05)	(0.44)	(-0.05)
Year	yes	yes	yes	yes	yes	yes	yes	yes
Industry	yes	yes	yes	yes	yes	yes	yes	yes
N	1975	8774	1975	8774	874	3780	874	3780
adj. R^2	0.2830		0.2922		0.3021		0.3433	

Table 5: The Use of Upfront Fees in Term Loans (Adjusted)

The table presents results of regressions on the adjusted upfront fee of term loans. In DealScan, if an upfront fee is charged on the entire amount of the deal, LPC will put that fee only on the revolving credit. To check whether this data collecting process generates some bias, if a term loan has no upfront fee information but is in the same deal accompanied by a revolver credit line with an upfront fee, we take the upfront fee of the credit line as that for the term loan, and we then have the adjusted upfront fees of term loans for the regressions in this table. The columns differ in the variables included as well as the empirical model employed, as indicated by the column headers. All the variables are described in Table 1, and all the regressions control for the year and 2-digit industry fixed effects. Standard errors are clustered at the firm level and corrected for heteroskedasticity. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, and t-values are shown in parentheses.

	(1) OLS	(2) Heckman	(3) OLS	(4) Heckman	(5) OLS	(6) Heckman	(7) OLS	(8) Heckman
Spread	0.167***	0.183***	0.139***	0.152***	0.179***	0.188***	0.140***	0.144***
	(10.86)	(7.05)	(9.66)	(7.91)	(7.72)	(8.57)	(6.71)	(7.73)
Syndication	2.451	-15.407	-0.095	-22.785	12.025*	-2.574	8.394	-20.573
	(0.43)	(-0.56)	(-0.02)	(-0.86)	(1.79)	(-0.09)	(1.29)	(-0.67)
ITL	-9.803***	-6.855	-7.835**	-3.920	-17.420***	-14.989**	-12.945**	-7.506
	(-2.64)	(-1.16)	(-2.13)	(-0.65)	(-3.17)	(-2.16)	(-2.37)	(-0.90)
Security	22.173***	31.098**	22.014***	32.827**	28.131***	43.863	27.279***	56.735*
	(3.64)	(2.05)	(3.68)	(2.29)	(3.59)	(1.46)	(3.58)	(1.78)
PSD	-7.283**	-8.167**	-6.655**	-7.634*	-8.663*	-10.154*	-6.521	-8.841
	(-2.16)	(-2.04)	(-1.97)	(-1.90)	(-1.91)	(-1.83)	(-1.47)	(-1.45)
Crisis			.	-67.877***			.	-110.107***
			.	(-3.74)			.	(-3.96)
Sprd_Crisis			0.117***	0.146***			0.222***	0.286***
			(2.66)	(3.54)			(2.99)	(3.66)
logAmount	4.519***	7.159*	4.328***	7.539*	9.768***	11.513***	9.138***	12.258***
	(3.41)	(1.73)	(3.28)	(1.95)	(2.79)	(2.91)	(2.74)	(2.91)
logMaturity	-4.568	-3.868	-5.360*	-4.668	-5.419	-2.234	-7.360	-1.772
	(-1.48)	(-1.32)	(-1.74)	(-1.61)	(-1.14)	(-0.33)	(-1.54)	(-0.25)
Refinance	-7.115	-8.600*	-7.484	-9.367*	-3.212	-8.637	-3.375	-13.510
	(-1.24)	(-1.72)	(-1.31)	(-1.86)	(-0.44)	(-0.74)	(-0.49)	(-1.06)
Amendment	-1.909	-1.181	-1.726	-0.638	1.849	4.083	1.845	6.426
	(-0.47)	(-0.27)	(-0.44)	(-0.14)	(0.34)	(0.60)	(0.34)	(0.82)
logAssets					-4.839	-4.788*	-4.674	-4.503
					(-1.51)	(-1.93)	(-1.46)	(-1.58)
Leverage					-4.430	-5.718	-3.224	-5.620
					(-0.41)	(-0.57)	(-0.31)	(-0.49)
Q					-1.781	-1.758	-1.792	-1.685
					(-0.97)	(-1.00)	(-0.99)	(-0.82)
Profitability					-31.879	-108.749	-37.354	-181.078
					(-0.54)	(-0.72)	(-0.62)	(-1.13)
Tangibility					-0.415	-4.002	-2.908	-9.645
					(-0.03)	(-0.28)	(-0.23)	(-0.61)
CashFlowRisk					-42.155	-167.896	-20.827	-252.766
					(-0.32)	(-0.64)	(-0.15)	(-0.91)
ZScore					0.292	0.190	0.315	0.111
					(0.69)	(0.29)	(0.66)	(0.15)
Year	yes	yes	yes	yes	yes	yes	yes	yes
Industry	yes	yes	yes	yes	yes	yes	yes	yes
N	2356	8774	2356	8774	1038	3780	1038	3780
adj. R^2	0.2688		0.2766		0.2865		0.3137	

Table 6: The Use of Upfront Fees in both Term Loans and Revolver Credit Lines

The table presents empirical results when the effect from the financial crisis is considered. All the variables are described in Table 1. The dependent variable is the upfront fee. Column (1)-(3) are based on the "DealScan Sample" while (4)-(6) are on the "DealScan-Compustat Sample". The results include two OLS regressions and one Logit regression. In the Logit model, the upfront fee is a binary dummy variable, equaling zero for a "N/A" and one otherwise. In the first OLS model, all "N/As" in the sample are considered as zero. In the second OLS model, all "N/As" are considered as random missing values. Standard errors are clustered at the firm level and corrected for heteroskedasticity. ***, **, and * indicate p-values of 1%, 5% and 10%, respectively.

	(1) OLS	(2) Heckman	(3) OLS	(4) Heckman	(5) OLS	(6) Heckman	(7) OLS	(8) Heckman
Spread	0.214***	0.211***	0.184***	0.194***	0.207***	0.193***	0.173***	0.169***
	(16.19)	(7.62)	(15.51)	(8.88)	(11.26)	(12.13)	(10.67)	(13.83)
Syndication	4.974	6.501	3.434	-3.665	6.618*	16.559*	4.766	9.531
	(1.61)	(0.43)	(1.12)	(-0.25)	(1.71)	(1.73)	(1.24)	(1.10)
ITL	-14.360***	-14.176***	-13.830***	-13.912***	-17.537***	-14.810***	-16.529***	-15.180***
	(-3.69)	(-4.78)	(-3.55)	(-4.63)	(-2.94)	(-2.97)	(-2.88)	(-3.45)
Security	9.908***	8.677	10.763***	16.425	8.059***	-3.481	8.035***	2.772
	(4.00)	(0.70)	(4.42)	(1.37)	(2.82)	(-0.32)	(2.92)	(0.29)
PSD	-10.178***	-10.327***	-9.354***	-8.748***	-9.845***	-8.729***	-8.454***	-8.064***
	(-4.81)	(-4.30)	(-4.43)	(-3.55)	(-3.58)	(-2.85)	(-3.16)	(-3.00)
Crisis			-	-53.827***			-	-65.701***
			-	(-2.99)			-	(-4.82)
Sprd_Crisis			0.134***	0.148***			0.212***	0.198***
			(3.73)	(4.74)			(4.09)	(6.33)
logAmount	4.329***	4.214***	3.867***	4.322***	3.567*	1.606	3.105*	2.212
	(5.26)	(3.38)	(4.82)	(3.69)	(1.94)	(0.73)	(1.78)	(1.17)
logMaturity	0.517	0.575	-0.038	-0.310	2.760	1.408	2.404	1.775
	(0.31)	(0.38)	(-0.02)	(-0.21)	(1.16)	(0.61)	(1.03)	(0.86)
Refinance	-8.631**	-8.023	-8.212**	-10.776*	-9.937**	-3.627	-8.168**	-5.289
	(-2.55)	(-1.31)	(-2.43)	(-1.83)	(-2.41)	(-0.55)	(-2.02)	(-0.92)
Amendment	-1.830	-2.085	-1.366	-0.297	-0.839	-3.575	-0.195	-1.500
	(-0.77)	(-0.65)	(-0.59)	(-0.09)	(-0.29)	(-0.92)	(-0.07)	(-0.43)
logAssets					1.039	3.633	0.978	2.182
					(0.66)	(1.38)	(0.62)	(0.95)
Leverage					5.887	12.222	5.045	8.041
					(0.85)	(1.55)	(0.73)	(1.15)
Q					-1.836**	-2.387**	-1.701*	-1.964**
					(-2.01)	(-2.16)	(-1.85)	(-2.10)
Profitability					-31.593	34.942	-41.434	-11.033
					(-1.25)	(0.53)	(-1.61)	(-0.19)
Tangibility					4.709	12.992	3.709	7.551
					(0.62)	(1.25)	(0.51)	(0.82)
CashFlowRisk					12.133	67.617	11.468	36.185
					(0.22)	(0.94)	(0.20)	(0.57)
ZScore					0.022	0.352	-0.009	0.145
					(0.07)	(0.81)	(-0.03)	(0.38)
Year	yes	yes	yes	yes	yes	yes	yes	yes
Industry	yes	yes	yes	yes	yes	yes	yes	yes
N	5080	23572	5080	23572	2552	11549	2552	11549
adj. R^2	0.3110		0.3225		0.3096		0.3369	

Table 7: Robustness Check 1: taking missing upfront fees as zero

The table presents results of regressions on the upfront fee of term loans, taking missing value of the upfront fee as zero. The columns differ in the variables included as well as the empirical model employed, as indicated by the column headers. All the variables are described in Table 1, and all the regressions control for the year and 2-digit industry fixed effects. Standard errors are clustered at the firm level and corrected for heteroskedasticity. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, and t-values are shown in parentheses.

	(1) OLS	(2) Tobit	(3) OLS	(4) Tobit	(5) OLS	(6) Tobit	(7) OLS	(8) Tobit
Spread	0.046***	0.133***	0.032***	0.102***	0.041***	0.097***	0.029***	0.069***
	(8.43)	(7.56)	(7.11)	(24.14)	(4.69)	(3.90)	(3.90)	(11.32)
Syndication	-11.430***	-53.973***	-12.650***	-56.515***	-6.575**	-33.988***	-7.686**	-36.453***
	(-4.16)	(-5.81)	(-4.62)	(-27.91)	(-2.07)	(-2.96)	(-2.44)	(-13.11)
ITL	1.029	-5.686	1.400	-4.179***	-2.912	-9.751	-2.284	-7.785***
	(0.77)	(-1.06)	(1.04)	(-2.69)	(-1.27)	(-1.18)	(-1.01)	(-3.72)
Security	11.276***	48.436***	10.656***	47.025***	13.146***	65.076***	12.419***	63.140***
	(5.33)	(4.57)	(5.08)	(23.46)	(5.34)	(4.73)	(5.15)	(22.65)
PSD	-2.089*	-3.160	-1.902	-2.686*	-2.667	-5.871	-2.128	-4.741**
	(-1.69)	(-0.58)	(-1.54)	(-1.95)	(-1.45)	(-0.82)	(-1.16)	(-2.43)
Crisis			-69.065***	-814.093***			-	-739.842***
			(-6.55)	(-208.88)			-	(-129.87)
Sprd_Crisis			0.059***	0.122***			0.064**	0.142***
			(3.57)	(17.82)			(2.13)	(13.68)
logAmount	3.014***	11.071***	2.949***	10.821***	3.429**	9.146**	3.261**	8.697***
	(5.62)	(5.09)	(5.55)	(92.16)	(2.42)	(2.02)	(2.34)	(52.51)
logMaturity	-0.842	0.547	-1.148	-0.359	-0.054	5.063	-0.490	3.754***
	(-0.70)	(0.14)	(-0.95)	(-0.70)	(-0.03)	(0.96)	(-0.30)	(5.17)
Refinance	-3.961**	-15.684**	-4.058**	-15.852***	-6.273**	-23.728**	-6.144**	-23.043***
	(-2.08)	(-2.24)	(-2.15)	(-8.70)	(-2.04)	(-2.34)	(-2.04)	(-8.92)
Amendment	0.232	-1.756	0.705	-0.938	0.762	4.893	1.181	5.496***
	(0.16)	(-0.27)	(0.48)	(-0.66)	(0.39)	(0.61)	(0.62)	(2.69)
logAssets					-1.197	-4.522	-1.120	-4.335***
					(-0.85)	(-0.98)	(-0.79)	(-25.93)
Leverage					-2.603	-8.975	-2.295	-8.835**
					(-0.58)	(-0.56)	(-0.51)	(-2.11)
Q					-0.346	-0.852	-0.264	-0.710
					(-0.33)	(-0.27)	(-0.25)	(-0.93)
Profitability					-28.836	-201.666**	-26.850	-194.320***
					(-0.98)	(-1.99)	(-0.92)	(-13.17)
Tangibility					-7.229	-21.718	-7.155	-22.100***
					(-1.37)	(-1.13)	(-1.38)	(-4.08)
CashFlowRisk					-17.382	-317.174*	-13.782	-298.846***
					(-0.46)	(-1.84)	(-0.37)	(-6.88)
ZScore					0.113	0.174	0.107	0.159
					(0.23)	(0.12)	(0.21)	(1.13)
Year	yes	yes	yes	yes	yes	yes	yes	yes
Industry	yes	yes	yes	yes	yes	yes	yes	yes
N	8774	8774	8774	8774	3780	3780	3780	3780
adj./pseudo R^2	0.1194	0.0451	0.1255	0.0457	0.0984	0.0405	0.1060	0.0414

Table 8: Robustness Check 2: 3-digit SIC industry fixed effects

The table presents results of regressions on the upfront fee of term loans. The columns differ in the variables included as well as the empirical model employed, as indicated by the column headers. All the variables are described in Table 1, and all the regressions control for the year and 3-digit industry fixed effects. Standard errors are clustered at the firm level and corrected for heteroskedasticity. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, and t-values are shown in parentheses.

	(1) OLS	(2) Heckman	(3) OLS	(4) Heckman	(5) OLS	(6) Heckman	(7) OLS	(8) Heckman
Spread	0.185***	0.218***	0.152***	0.167***	0.203***	0.243***	0.157***	0.180***
	(8.78)	(6.53)	(8.80)	(6.43)	(7.38)	(4.20)	(7.38)	(3.56)
Syndication	4.008	-23.310	1.703	-14.575	11.802	-51.916	9.038	-51.496
	(0.62)	(-0.91)	(0.27)	(-0.63)	(1.48)	(-0.88)	(1.16)	(-0.92)
ITL	-14.941***	-17.320***	-12.015**	-13.205***	-24.657***	-30.854*	-19.729***	-24.747
	(-3.04)	(-3.17)	(-2.49)	(-2.68)	(-3.43)	(-1.71)	(-3.04)	(-1.48)
Security	19.386***	36.775**	19.139***	29.081*	32.280***	103.163	25.337**	90.289
	(2.97)	(2.04)	(3.05)	(1.82)	(2.87)	(1.53)	(2.40)	(1.46)
PSD	-8.651**	-7.543	-8.272*	-7.567*	-7.066	-7.427	-5.896	-5.693
	(-2.06)	(-1.53)	(-1.96)	(-1.68)	(-1.17)	(-0.47)	(-0.99)	(-0.39)
Crisis			-	-38.094**			-	-67.588
			-	(-1.98)			-	(-0.82)
Sprd_Crisis			0.122**	0.138***			0.266***	0.336***
			(2.12)	(4.04)			(2.73)	(2.77)
logAmount	4.181***	8.292**	3.950**	6.304*	11.790***	17.571*	10.552***	15.650*
	(2.63)	(2.06)	(2.51)	(1.78)	(3.08)	(1.95)	(2.87)	(1.89)
logMaturity	-3.916	-2.544	-5.485	-4.796	-7.410	8.085	-10.069*	3.855
	(-0.95)	(-0.69)	(-1.32)	(-1.44)	(-1.27)	(0.46)	(-1.73)	(0.24)
Refinance	-8.824	-14.103*	-8.805	-11.866*	-2.987	-24.254	-2.513	-21.973
	(-1.22)	(-1.91)	(-1.21)	(-1.78)	(-0.34)	(-0.89)	(-0.29)	(-0.87)
Amendment	0.273	0.252	0.330	0.414	2.452	13.979	0.808	11.987
	(0.05)	(0.05)	(0.06)	(0.08)	(0.35)	(0.70)	(0.11)	(0.64)
logAssets					-7.717**	-11.376	-6.643*	-9.896
					(-2.21)	(-1.33)	(-1.86)	(-1.25)
Leverage					-2.144	-3.351	1.376	-0.061
					(-0.16)	(-0.11)	(0.11)	(-0.00)
Q					-2.313	-3.803	-2.679	-3.980
					(-1.22)	(-0.68)	(-1.38)	(-0.77)
Profitability					-19.951	-388.945	-40.757	-378.841
					(-0.29)	(-1.09)	(-0.57)	(-1.15)
Tangibility					-11.874	-57.468	-14.634	-56.922
					(-0.55)	(-0.96)	(-0.74)	(-1.02)
CashFlowRisk					-72.169	-633.989	-45.550	-556.763
					(-0.44)	(-1.03)	(-0.25)	(-0.99)
ZScore					0.393	0.823	0.476	0.841
					(0.96)	(0.43)	(1.03)	(0.48)
Year	yes	yes	yes	yes	yes	yes	yes	yes
Industry	yes	yes	yes	yes	yes	yes	yes	yes
N	1975	8774	1975	8774	874	3780	874	3780
adj. R^2	0.2760		0.2840		0.2918		0.3270	