When Are Financial Covenants Relevant?

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Abstract

We show that financial covenants may have no value for creditors of highly levered firms, because an attempt to enforce their rights in technical default would result in a lower payoff than waiving the covenant and ceding control to shareholders. This explains the widespread use of cov-lite loans by levered firms. By contrast, for investment-grade firms tightly set covenants allow creditors to demand full repayment while the firm is still solvent. This ensures that creditors sustain no loss regardless of the underlying default probability, mitigating their concerns about the firm's financial health and alleviating adverse selection in lending. We show that the optimal strictness of financial covenants is hump-shaped in the firm's leverage.

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Introduction

Recent years have seen a dramatic increase in the so-called cov-lite loans issued by low-rated firms. These loans are stripped of financial covenants, which traditionally have been thought to provide creditors with a cushion of safety by giving them the right to demand immediate loan repayment if the firm's financial conditions deteriorate enough to trigger technical default. Although such covenants used to be an integral part of loan contracts, they have become much less common in recent years, so much so that by some estimates close to 80% of levered loans issued in 2017–18 have been classified as cov-lite. These developments in the loan market have caused much concern among practitioners and regulators. A number of high-profile publications have argued that the prevalence of cov-lite loans is likely to result in high losses for the "unprotected" loan investors when defaults increase at the turn of the credit cycle.[1]

The standard rationale for the use of covenants adopted in the literature since Smith and Warner (1979) is that by giving creditors conditional control rights, covenants mitigate agency issues when the incentives of shareholders who control the firm's investment policy diverge from those of the creditors. However, there are important differences between covenants of different types, and in particular, between "maintenance" and "incurrence" covenants. Incurrence covenants restrict certain actions by the firm, such as dividend payments, additional borrowing, or particular investments, and are violated if the firm engages in prohibited activities. Arguably, it is covenants of this kind that are best suited to curb borrowers' attempts to transfer value from creditors through opportunistic investment and financial choices. Importantly, incurrence covenants are still commonly included both in cov-lite and 'cov-heavy' loan contracts (Becker and Ivashina (2016)), and hence asset substitution is no more likely under cov-lite loans.[2] Instead, what is missing from such loans is so-called "maintenance" covenants, which require that

[1]For example, statistics on the use of cov-lite loans are reported in Robin Wigglesworth, "Why parts of Wall Street are fretting over toxic loans", Financial Times (July 4, 2019) and Joe Rennison and Colby Smith, "Debt machine: are risks piling up in leveraged loans?", Financial Times (January 21, 2019), while Colby Smith, "Leveraged Loans Are Way Past 'Cov-Lite' " Financial Times (November 16, 2018) and Sam Fleming, "Janet Yellen Sounds Alarm Over Plunging Loan Standards" Financial Times (October 17, 2018) raise concerns about these developments.

[2]In practice, important incurrence covenants, such as the right to transfer valuable assets out of the reach of creditors,

particular financial metrics remain within a specified range (for example, that the interest coverage ratio stays above a certain threshold). Firms violate such covenants when their financial health deteriorates, and managers have less control over this process than over investment and dividend decisions. Once a covenant is violated, creditors generally can exercise control by demanding the immediate repayment of the loan in full, in order to prevent further erosion of the loan value in distress. In this paper, we take the presence of incurrence covenants as given, and aim to explain differences in the use of *maintenance* covenants, which is what separates cov-lite and cov-heavy loans.[3]

In this paper, we first demonstrate that for highly levered firms maintenance covenants may be irrelevant, and the concerns about the proliferation of cov-lite loans often raised by practitioners and regulators may be misplaced. The intuition is straightforward. When a covenant is violated, creditors face the choice between enforcing the covenant by demanding immediate repayment, and waiving it and allowing the shareholders to continue operating the firm as a going concern. Since an attempt to enforce the covenant when the firm is insolvent must trigger either costly bankruptcy or renegotiation, the corresponding costs will be born by the creditors as the cost of covenant enforcement. By contrast, by waiving the covenant creditors allow shareholders to continue to have a claim on the firm's assets, and hence the value of equity in continuation can be thought of as the part of the firm's asset value that creditors give up when they waive the covenant and cede control to shareholders. When leverage is high enough, the value of equity 'given up' by creditors in continuation may well turn out to be lower than the cost of bankruptcy or the costs of renegotiating with dispersed creditors, which would be incurred as a result of covenant enforcement. In such situations creditors would prefer waiving the covenant to exercising control in technical default, and hence attach no value to such covenants ex ante. Given that covenants are irrelevant ex post, firms with high enough leverage would then issue cov-lite loans, particularly when renegotiation and bankruptcy costs are likely to be high.

are occasionally found missing from some loan contracts, which often inflames the rhetoric against cov-lite loans in the media. However, the absence of incurrence covenants is atypical, and does not define cov-lite loans as such.

[3] In what follows, we use the terms 'maintenance covenants', 'financial covenants', and simply 'covenants', interchangeably.

This simple theory has several distinct implications that appear broadly consistent with empirical evidence. First, because covenant violations are likely to be ignored by creditors of distressed firms, the absence of covenants should have no effect on loan default probabilities and recovery rates. Using data on defaults and recovery rates from Moody's, we show that cov-lite loans are no more likely to end in default than cov-heavy loans of firms with similar leverage. And although average recovery rates for cov-lite loans are lower, the differences are insignificant after controlling for the fact that cov-heavy loans are much better collaterallized. Second, if covenants are irrelevant ex post, their absence should not result in higher loan spreads ex ante. Consistent with this view, we note that the difference between the returns on corporate bonds and levered loans has remained stable over the last two decades, despite the exponential growth of the fraction of cov-lite loans among the latter. These findings cast doubt on the popular perception that cov-lite loans are issued to satisfy the demand from investors trying to "reach for yield", who accept the lack of covenant protection in exchange for higher loan yields. To re-iterate, if covenants have no value ex post, their absence does not raise loan yields ex ante.

Our argument also highlights the effect that high leverage in conjunction with high costs of dealing with technical default (such as the costs of renegotiating the loan contract in the presence of multiple lenders) has on creditors' incentives to exercise control in technical default. In light of this relationship, we point out two trends in the data that may have contributed to the surge of cov-lite loans in recent years. First, average leverage ratios among levered borrowers have been trending up in recent years. Second, non-bank institutional investors have assumed a prominent role in the syndicated loan market, which may have increased creditor coordination problems and thus renegotiation costs (Becker and Ivashina (2016); Billett et al. (2016)). Both of these tendencies are consistent with the growing popularity of cov-lite loans in the levered loan segment. Lastly, we emphasize that it is high leverage rather than high default risk that is predicted to be associated with cov-lite loan issuance. In particular, even though leverage and volatility are both major factors affecting credit risk (for example, both are key determinants of the distance to default in structural models of credit risk), high volatility is not associated with a higher propensity to issue cov-lite loans, whereas high leverage clearly is. The differential role of leverage and credit risk casts further doubt on investors' search for yield as the reason behind the surge in cov-lite loans.

In addition to explaining the absence of covenants in the levered loan segment, our paper also proposes a novel explanation for their use by moderately-levered firms. It is noteworthy that, while cov-lite loans have become the norm for the riskiest firms, investment-grade borrowers have shown no similar tendency to reduce the use of covenants. This appears puzzling, given that intuitively the 'protection' afforded by covenants should be most valuable for creditors of riskiest firms. Our paper provides a new rationale for the inclusion of maintenance covenants in loans of such firms that is based on asymmetric information.

We start with the observation that if a firm violates a covenant while still solvent and creditors decide to enforce their rights, the firm should be able to repay the loan in full by selling some assets or refinancing the loan. This ability to recover the full loan amount when the firm's conditions deteriorate effectively makes the covenant-protected loan risk-free irrespective of the underlying probability of default and bankruptcy. Crucially, creditors will also view the protected loan as risk-free even if they disagree with the shareholders about the firm's financial health, as long as there is no ambiguity about its ability to repay the loan upon a covenant violation. As a result, in the presence of information asymmetry between firm insiders and outsiders, financial covenants can create value by removing the ambiguity about the expected default risk and thus mitigating the adverse selection problem faced by outside investors (Myers and Majluf, 1984).

We formalize this intuition by introducing covenants in a dynamic structural model with asymmetric information, and use it to derive the optimal strictness of loan covenants, which trades off the benefits of mitigating adverse selection against the expected costs of loan renegotiation in technical default. We show that the optimal covenant strictness is hump-shaped in the firm's leverage. On the one hand, covenants are irrelevant for highly levered firms because they would not be enforced ex post. On the other hand, covenants' ability to mitigate creditors' concerns about credit risk is also not very valuable when the firm is already very safe due to its low leverage. It is for intermediate levels of leverage under asymmetric information that covenants are most valuable.

Empirically, using loan data from Dealscan we show that the propensity to issue a cov-lite loan is highest for most highly levered firms, but also elevated for safest firms. We find that covenant strictness, which we measure as the ex ante probability of a covenant violation (Murfin, 2012), mirrors this pattern. We also derive predictions about the dependence of covenant strictness on information asymmetry and renegotiation costs, which are broadly supported by the data.

Our paper is the first to point out that the absence of maintenance covenants may be inconsequential at high leverage levels because continued operations under shareholders' control may result in a higher debt value than costly covenant enforcement. To the best of our knowledge, this is also the first academic study to look at default frequencies and recovery rates for cov-lite loans empirically. Furthermore, we provide a rationale for financial covenants in the absence of agency problems as a means of mitigating adverse selection, and to derive the optimal covenant tightness. Covenants have been thought of as a means of allocating control rights; shareholders run the firm when performance is good, and creditors step in during financial distress, when agency conflicts between insiders and outsiders are more likely to arise (Smith Jr, 1993). We show that, in the absence of agency conflicts (moral hazard), financial covenants can be used by moderately levered firms to alleviate adverse selection problems when raising debt.

The remainder of the paper is organized as follows. The next section provides an overview of the existing literature on the role of covenants and cov-lite loans. Section 2 discusses creditors' incentives to enforce a covenant in a simple static setting, and provides the basic intuition for the trade-offs that determine the optimal covenant strictness. Section 3 outlines the full dynamic model, and presents its predictions. Section 4 studies the ex ante determinants of covenant strictness and the propensity to issue cov-lite loans. Section 5 compares realized default losses on cov-lite and cov-heavy loans and looks whether the rising popularity of cov-lite loans has had en effect on loan returns. Section 6 concludes. Further technical details are provided in the Appendix.

1. Institutional framework and literature review

Before discussing the theoretical and empirical literature on the role of covenants and cov-lite loans, it is useful to provide a detailed definition of cov-lite loans. There exist many different types of covenants and the two main categories are maintenance covenants and incurrence covenants. Incurrence covenants restrict the firm from taking actions that could reduce its ability to service the debt. For example, an incurrence covenant might restrict the ability to pay dividends under some conditions – e.g., EBITDA/debt drops below a certain threshold. Maintenance (or financial) covenants set ratios and thresholds for some observable metrics, such as net worth. Lenders periodically check whether a firm is in violation of any of the maintenance covenants and, if that is the case, the firm is in technical default. A cov-lite loan does not have maintenance covenants but it might have incurrence covenants. Such loans first appeared in the United States in the years immediately before the 2008 financial crisis (Billett et al., 2016) and they became even more prevalent after 2010 for the market of highly leveraged loans (Paterson, 2019).

Several papers studied the role of covenants in mitigating asymmetric information (e.g., Rajan and Winton, 1995; Garleanu and Zwiebel, 2008; Lemmon and Zender, 2019). Garleanu and Zwiebel (2008) illustrate that covenants can increase firm value in the presence of asymmetric information. When renegotiation costs are sufficiently low, the optimal debt contract entails tight covenants that are frequently violated and, upon violation, they are not enforced but renegotiated. Lemmon and Zender (2019) extend the results in Garleanu and Zwiebel (2008) by allowing for endogenous leverage decisions and show that firms subject to high renegotiation costs optimally choose low levels of leverage. On the contrary, firms for which renegotiation costs are low prefer high leverage and restrictive covenants. Using existing theories of capital structure, we contribute to this literature by showing that maintenance covenants are not effective at mitigating asymmetric information when the firm is highly levered. Our intuition is that enforcing covenants causes creditors of highly levered firms to be worse off compared to waiving them, thus making maintenance covenants irrelevant. At the same time, we show that maintenance covenants increase firm value when leverage is low. Our empirical results confirm these predictions.

The literature has started to address the reasons behind the recent increase in issuance of cov-lite loans. Billett et al. (2016) demonstrate that cov-lite loans arise when the bank participation in a loan is very low and there is a dual agency problem.[4] Becker and Ivashina (2016) provide empirical evidence that the investors' base in the leverage loan market has become more dispersed (e.g. more lenders per loan), which would imply higher coordination costs amongst creditors in the event of renegotiation. Cov-lite loans mitigate these bargaining frictions by eliminating the need to renegotiate maintenance covenants. Berlin, Nini, and Edison (2020) show that cov-lite loans include in many cases a cov-heavy tranche (e.g. a line of credit) that is held by banks. Therefore, they argue that cov-lite loans help minimize renegotiation costs by splitting the control rights: banks are skillful at renegotiation and are given contracts with maintenance covenants while non-bank investors hold cov-lite tranches because they would incur high renegotiation costs. Prilmeier and Stulz (2019) show that cov-lite loans are a substitute for public bonds because they have weaker disclosure requirements. We contribute to this literature by highlighting an alternative channel to explain the existence of cov-lite loans which complements the results from the previous papers. We show that maintenance covenants decrease firm value for highly levered firms, thus providing an explanation for the rise of cov-lite loans in the leveraged loan market.

Traditionally, banks managed the agency conflict through the use of maintenance covenants (Chava

[4] Specifically, Billett et al. (2016) show that covenant strictness – measured by the number of covenants – increases as the bank participation in the loan falls but only up to a certain threshold. Below such threshold, the bank has no incentive to monitor the firm as its participation in the loan is very low. Therefore, it is optimal to have a cov-lite loan as the monitoring costs of the non-bank institutions may be too high compared to the benefits of monitoring.

and Roberts, 2008; Nini et al., 2012) in their loan agreements. If a financial ratio – e.g. EBITDA/debt ratio – falls below the threshold agreed in the contract, the firm is considered to be in technical default. A covenant violation leads to technical default but, in the vast majority of cases, contracts are renegotiated rather than being enforced. [5] When a contract is renegotiated, laws require the syndicate participants to give a unanimous approval to the change. This implies that the number and complexity of covenants depends strongly on the composition of the syndicate with larger syndicates opting for 'lighter' covenant packages (Billett et al., 2016; Saavedra, 2018).[6] Our paper contributes to this literature by showing – both theoretically and empirically – that the likelihood of a firm issuing cov-lite loans is increasing in proxies for renegotiation costs.

2. Covenants' (Ir-) Relevance: A simple illustration

To provide the intuition behind our predictions, in this section we discuss creditors' incentives to enforce a covenant violation in a simple stylized framework. The next section generalizes the argument in a continuous-time structural model with asymmetric information that allows for costly contract renegotiation and enforcement, which we will use to derive predictions regarding the covenants' value and their optimal tightness.

A key restriction we deliberately impose in our model is the assumption that the firm's investment policy is fixed. By contrast, most if not all other studies of covenants starting with Smith and Warner (1979) view covenants as a means of mitigating investment distortions that may arise as a result of diverging incentives between shareholders/managers and creditors. We abstract from agency issues by treating the firm's investment as given, in order to illustrate how covenants may create value in their

[5]For example, Roberts (2015) documents that more than 75% of technical violations result in renegotiation. Loan contracts have historically had very strict covenants causing them to be violated often (Christensen and Nikolaev, 2012) and, through this process, creditors are able to limit actions that favor equity (e.g., Nini et al., 2009). Indeed, covenant violations have strong and lasting effects on firm's future policies. Roberts and Sufi (2009) show that firms issue considerably less debt after having experienced a covenant violation. There is also evidence that firms cut investment (Chava and Roberts, 2008) as well as payouts and acquisitions (Nini et al., 2012) upon a covenant violation.

[6]Also, Ferracuti and Morris (2018) provide empirical evidence that, as renegotiation costs decrease, firms set tighter covenants and they violate them more often.

absence.

2.1. The setting

Consider a levered firm financed by equity and a long-term loan with a face value F. The firm's assets consist of illiquid long-term investments and have a market value V. The firm has no access to external financing, asset sales are prohibited outside of bankruptcy, and there is no renegotiation. The loan contract includes a maintenance covenant that specifies that the market value of assets must remain above some level V_C, which we refer to as the covenant threshold.[7] The investment policy is fixed, but the asset value can fall to or below V_C due to adverse economic conditions outside of the firm's control. Should this happen, the firm will be in technical default, which gives its creditors the right, but not the obligation, to enforce the covenant by demanding the immediate repayment of the full face value of the loan, F. Alternatively, the creditors can choose to permanently waive the covenant (ignore the violation).

As the firm's assets are illiquid and it has no access to external financing, creditors' decision to enforce the covenant by demanding immediate repayment would push the firm into bankruptcy. Assume that the firm's assets can be sold in bankruptcy at a fractional cost α, which can be thought of as the cost of bankruptcy. Given that the value of assets in technical default equals V_C, the net proceeds in bankruptcy are $(1-\alpha)V_C$. If this amount is greater than the loan (implying $V_C \geq F/(1-\alpha)$), the creditors are repaid in full and shareholders receive the balance of the asset value; otherwise creditors incur a loss and shareholders get nothing. Denote the payoffs to creditors under covenant enforcement by D_L (the 'liquidation' or 'recovery' value of debt). The dashed red line in Figure 1 plots D_L as a function of the firm's asset value in technical default, V_C .

Instead of enforcing the covenant, creditors can choose to waive it permanently, in which case the loan will remain outstanding with the original terms but stripped of the covenant, and the firm will continue

[7] In reality covenants may be specified in terms of various financial ratios rather than minimum required asset value. However, to the extent that technical default corresponds to a deterioration in the firm's financial health, restrictions on such ratios would correspond to a minimum required firm asset value, which measures the firm's general "well-being".

operations under shareholders' control. In general, when asset sales are restricted and shareholders are required to make regular debt payments in continuation, there exists a minimum asset value V_B below which equity becomes worthless, and hence shareholders file for bankruptcy and abandon the remaining assets to creditors, who recover $(1-\alpha)V$ after bankruptcy costs.[8] For asset values above this threshold shareholders keep their option alive by operating the firm while making the required debt payments. Denote by $D_U(V)$ the value of the 'unprotected' loan with the same terms but no covenants, when the asset value is V. When $V < V_B$, the firm is in bankruptcy and $D_U(V) = (1-\alpha)V$; otherwise, D_U is the continuation value of debt, which equals the present value of promised future loan payments net of expected default losses. The value of the unprotected loan D_U at the covenant threshold V_C is shown by the solid blue line in Figure 1.

[Insert Figure 1 here]

Whether creditors choose to enforce the covenant or waive it depends on whether the liquidation value D_L is higher or lower than the unprotected value D_U. As can be seen from Figure 1, covenant enforcement will be preferred if and only if the value of assets in technical default, V_C is high enough. This will be the case when $V_C > \underline{V_C}$, where $\underline{V_C}$ is the minimum asset value V that satisfies $(1-\alpha)V \geq D_U(V)$. For asset values below this threshold creditors are better off waiving the covenant and ceding control to shareholders rather than pushing the firm into bankruptcy.

2.2. The highly levered firm

This simple model shows that when the value of assets in technical default is low relative to the debt claim, creditors have no incentives to enforce the covenant, because their value in continuation is higher than in bankruptcy. This means that such covenants are irrelevant and have no value ex post or ex ante. Thus, we should not observe loan contracts with covenant thresholds set below $\underline{V_C}$, the level at which the

[8] The threshold asset value V_B is known in structural models such as Leland (1994) as the default boundary. Such models often assume that shareholders choose this threshold to maximize the value of equity by trading off the costs of running the firm against the benefits of keeping their option alive.

recovery value of debt falls below its continuation value.

While this argument is based on the creditors incentives in technical default ex post, it implies that ex ante at the time when the loan contract is designed some firms will find it impossible to specify any covenant that creditors would consider relevant and valuable. Indeed, suppose that at the time when the loan contract is signed the value of the firm's assets is already below $\underline{V_C}$. Should the firm try to issue protected debt, the covenant threshold would have to be set no higher than the initial asset value, since otherwise the covenant would be violated immediately. But for thresholds $V_C < \underline{V_C}$ creditors will never enforce such a covenant later in technical default. In other words, under no feasible covenant threshold will the creditors of such a firm attach any value to the covenant. As a result, covenants will be viewed as irrelevant and will not be optimally included in the loan contract.

The sufficient condition for the irrelevance of all feasible covenants is that the asset value at the time when the contract is signed, V_t, satisfies $(1-\alpha)V_t < D_U(V_t)$, which can be re-written as:

$$D_U(V_t)/V_t > 1 - \alpha. \tag{1}$$

The term on the left hand side can be (loosely) interpreted as the firm's leverage ratio at the time of signing the loan contract.[9] It follows that firms with leverage above a certain threshold will not issue covenant-protected debt. As a rough benchmark, this simple model predicts that when renegotiation with creditors is not possible, a firm for which the costs of financial distress amount to 30% of its value (which corresponds to estimates of default costs for BBB-rated firms provided by Davydenko et al. (2012)), will not issue covenant-protected debt if its leverage exceeds 70%.

Thus, this argument rationalizes the widespread use of cov-lite loans by highly-levered firms. It also implies that for highly levered firms the absence of financial covenants has no effect on the outcome of

[9] This interpretation is inexact inasmuch as the value of the firm's assets is not the same as the firm value. The difference between the two arises due to the present value of bankruptcy costs and tax benefits.

default, including recovery rates for creditors.

2.2.1. Avoiding bankruptcy through renegotiation

In reality, covenant violations typically result in a waiver or renegotiation rather than bankruptcy (Denis and Wang, 2014; Roberts, 2015). Nonetheless, the above logic also applies in situations when the parties can renegotiate the loan contract in technical default at a cost. To see this, we can think of α as the cost of renegotiating the contract rather than the cost of bankruptcy, and assume that in renegotiation shareholders have no bargaining power, so that the creditors appropriate the full renegotiation surplus net of renegotiation costs. After this re-labeling, the argument above applies verbatim, and it follows that a firm with a sufficiently high leverage ratio will not be able to include financial covenants that the creditors would view as relevant. However, to the extent that renegotiation costs are likely to be lower than bankruptcy costs, Equation (1) implies the threshold leverage ratio above which covenants become irrelevant will be higher than when covenant enforcement triggered automatic bankruptcy. Thus, the model highlights the key role of renegotiation frictions for the emergence of cov-lite loans, and suggests that higher costs correspond to wider ranges of parameters under which firms issue such loans. This prediction echoes Billett et al. (2016) and Becker and Ivashina (2016), who argue that the use of cov-lite loans is associated with high creditor coordination costs, for instance, between banks and institutional investors, or between institutional investors themselves. In addition, another factor identified by our model as key for creditors' decision to waive covenants is leverage, which needs to be sufficiently high to make meaningful covenants infeasible. We suggest that the recent surge in cov-lite loans may have been precipitated by a combination of rising leverage and the emergence of dispersed institutional investors as key players in the leveraged loan market.

2.3. The low-levered firm

Figure 1 shows that for covenant thresholds above $\underline{V_C}$, the value of debt in liquidation (i.e., when creditors choose to enforce the covenant) exceeds its value in continuation. This makes the protected loan more valuable for the creditors ex post than the unprotected loan with the same terms.

The value of the covenant for creditors at $V = V_C$ is equal to $d = \max\{0, D_L - D_U\}$, which is represented by the orange solid line in Figure 1. This quantity can be though of as the value that creditors would attach to having control over the firm's liquidation decision when the asset value is V_C. As can be seen, the value of control is strictly positive when $V_C > \underline{V_C}$. Moreover, if the firm is solvent in technical default even after bankruptcy costs (i.e., $V_C \geq F/(1-\alpha)$), creditors can always ensure that the loan will be repaid in full if they choose to enforce the covenant. Assuming that the loan was originally issued at par (i.e., its initial market value was equal to F), this implies that creditors are guaranteed to sustain no loss if they decide to enforce the covenant in technical default. In other words, the covenant set above the firm's solvency level (but below the asset value at the time the loan is issued) essentially makes the loan risk-free regardless of the firm's underlying probability of default.

It is worth noting that the ex post value of the covenant, d, is hump-shaped in the covenant's threshold. It equals zero for $V_C < \underline{V_C}$, but it is also decreasing in V_C in the solvency region. This is because higher firm values imply lower probabilities of default and expected default losses for the unprotected loan, decreasing the value of the protection afforded by the covenant.

To summarize the predictions so far, there exists a covenant threshold $\underline{V_C}$ below which the value of debt in continuation is higher than that in liquidation, and hence creditors would never want to enforce the covenant in technical default. For highly levered firms any feasible covenant threshold may turn out to be below this level, making the covenants irrelevant. Thus, this theory explains the widespread use of cov-lite loans by highly levered firms. The range of leverage ratios for which covenants are irrelevant is wider when renegotiation costs are high, consistent with the observation that cov-lite loans are held by dispersed institutional investors. By contrast, when leverage is sufficiently low, it is feasible to set the covenant threshold above $\underline{V_C}$, in which case in technical default creditors prefer immediate repayment to continuation. For high enough thresholds such a covenant would make the protected loan risk-free regardless of the firm's probability of default, as long as the firm is certain to be solvent upon violating the covenant.

2.4. The role of covenants under asymmetric information

The simple argument above allows us to derive predictions about the conditions under which covenant may have value for creditors ex post, but it does not explain why shareholders might want to include them in the contract ex ante, given that loan interest rates can be adjusted to compensate for the presence or absence of the covenant. Moreover, if covenant enforcement involves deadweight losses, either because the firm is pushed into bankruptcy or because a costly renegotiation becomes necessary, then covenants are wasteful ex ante from shareholders' point of view, and should be avoided. If so, why do many firms use them?

Much of the literature has focused on the potential ability of covenants to mitigate agency problems. Such problems do not exist in our model, because the investment policy is assumed to be fixed. Instead, we point out that covenants can create value when the firm's insiders know more about the value of the firm than do potential creditors. In such situations the adverse selection problem may make it difficult for the firm to raise external financing (Myers and Majluf, 1984). To the extent that insiders and outsiders have diverging views about the firm's fundamentals, and hence may disagree about the firm's probability of default, the firm may find it difficult to borrow on the terms acceptable to the shareholders. We propose that under such conditions a low-levered firm may be able to remove the ambiguity about the loan's credit risk by including a covenant in the loan contract with a covenant threshold in the solvency region. If both insiders and creditors agree that upon violating the covenant the firm will have enough assets to repay the debt in full, they would all view the loan protected by such a covenant as free of default risk, regardless of their assessment of the firm's probability of default. Intuitively, even though creditors may be skeptical about the firm's financial health, the covenant guarantees that they will be able to recover their investment in full if the firm's fundamentals deteriorate enough to trigger technical default.

Below, we formalize this intuition in a structural model with asymmetric information, which allows us to derive the optimal covenant tightness that trades off the resolution of the adverse selection problem (which calls for tight covenants) against the cost of renegotiation in technical default (which are minimized by setting the covenants loosely).

3. The full model and empirical predictions

This section describes the dynamic model that we use to derive predictions regarding the optimal covenant strictness, and to show under which conditions firms will issue cov-lite loans. The model allows for loan repayment, renegotiation, and endogenous bankruptcy, and incorporates investors' uncertainty about the true financial health of the firm. At the same time, the firm's EBIT process is specified exogenously. This assumption allows us to abstract from the possible investment distortions that might arise from creditor/shareholder conflicts, in contrast to most existing models that argue that covenants are put in place precisely to alleviate such distortions. In practice, it is "incurrence" covenants that appear to be designed to address agency conflicts. These restrict the firm's ability to engage in risk shifting or take other deliberate actions that could decrease the value of its debt, like making dividend payments or certain investments. Such covenants are typically included even in those loans that are classified as cov-lite (Becker and Ivashina, 2016). We take their presence as given and thus assume the investment policy to be fixed. Our focus is instead on maintenance (or financial) covenants, that set ratios and thresholds for some observable metrics, such as debt to EBITDA, which are periodically checked by lenders.

3.1. Basic setup and informational assumptions

Consider a firm financed by an infinite-maturity loan with the face value F and coupon rate C, which is paid continuously. As in Goldstein, Ju, and Leland (2001), the firm's EBIT, X_t, follows a geometric

Brownian motion, $\frac{dX_t}{X_t} = \mu dt + \sigma dB_t$, implying that the value of the firm's assets at time t, $V(X_t)$, is proportional to X_t.

The firm issues a loan at time $t = 0$. If the loan has no covenants (an 'unprotected' loan), it continuously pays a coupon C as long as the firm's EBIT remains above a certain threshold value $X_B(C)$, referred to as the default boundary. The boundary is chosen by the firm to maximize the value of equity. Should X_t fall below X_B, the firm declares bankruptcy and is liquidated at a fractional cost α, whereby creditors receive $(1-\alpha)V(X_B)$ and shareholders get nothing.

Managers observe the firm's EBIT precisely at all times, but creditors can do so only after the loan is signed. At the time when the loan contract is negotiated (i.e., up to $t = 0$) creditors assume that X_0 is distributed normally, with the mean $\bar{X}_0$ and standard deviation γ. The parameter γ determines the degree of uncertainty, or information asymmetry (we use both terms interchangeably throughout this paper). The higher γ, the more disperse the distribution of X_0 is from the perspective of debtholders, that is, they are more "uncertain" about the true value of X_0. For simplicity, we assume that immediately after the loan contract is signed the information asymmetry is removed and the creditors are able to observe X_t perfectly for all $t > 0$.

For a given coupon, the introduction of asymmetric information introduces a wedge between the value of the loan as evaluated by the creditors and its true costs from shareholders' point of view. Creditors will undervalue the loan when their estimate of the firm value is biased downward, i.e., when $X_0 < \bar{X}_0$. But undervaluation will be present even when on average investors value the firm correctly ($X_0 = \bar{X}_0$) due to the uncertainty they face. Indeed, given that the value of the loan at $t = 0$ is a concave function of X_0, Jensen's inequality implies that the loan value for creditors at the time when the contract is signed is lower that that for the shareholders, who know X_0 with certainty. In other words, under information asymmetry creditors require a higher coupon rate to break even in expectation than under full information, resulting in a value transfer from the firm's shareholders, and giving rise to financing frictions (Myers and Majluf, 1984). We proceed to show that under certain conditions covenants can help mitigate this effect by making the value of the loan, as evaluated by creditors, less sensitive to the unobserved true value of the firm's assets.

3.2. Protected loan and technical default

A loan can be protected with a covenant that specifies the threshold value of EBIT, X_C, that triggers technical default. The threshold must lie below the initial level of EBIT (i.e., $X_C < X_0$), or else the firm would find itself in technical default immediately after issuing the loan. Also note that to be relevant, the threshold must exceed the default boundary that shareholders would choose under the current coupon rate C (i.e., $X_C > X_B(C)$); otherwise the firm would declare bankruptcy before violating the covenant. Put differently, a loan with such a loose covenant that $X_C < X_B$ is equivalent to an unprotected (cov-lite) loan with the same coupon.

The first time X_t falls below the covenant threshold, creditors can choose one of three responses. First, they can ignore (waive) the covenant violation. In this case, the covenant is canceled permanently and the loan becomes identical to an unprotected loan with the same coupon. Second, they can accelerate the loan by demanding the immediate repayment of the face value, F. The firm would then have to re-finance the loan at a cost f per dollar of face value, or else file for bankruptcy, which costs a fraction $\alpha > f$ of the value of assets. Hence, if upon the covenant violation the firm's asset value, V_C, is insufficient to repay the loan in full after taking into account the costs of refinancing (i.e., $V_C(X_C) < F/(1 - f)$, then the creditors' attempt to accelerate the loan will push the firm into bankruptcy, in which creditors receive $(1 - \alpha)V_C < F$ and shareholders receive nothing.

Finally, instead of waiving the covenant or demanding immediate loan repayment, in technical default the creditors can propose re-negotiating the debt contract. Renegotiation costs a fraction κ of the firm's asset value, but allows the firm to avoid the costs of refinancing or bankruptcy. In renegotiation, the parties play a Nash bargaining game, the outcome of which is decided as follows. First, shareholders and creditors determine their outside option as the payoffs that they would receive if creditors accelerated the loan and renegotiations broke down. Next, shareholders are attributed the fraction η of the renegotiation surplus (equal to the deadweight cost of covenant enforcement net of the cost of renegotiation), where $0 \leq \eta \leq 1$ corresponds to the equity's bargaining power, and the creditors are awarded the balance of the surplus.[10] Finally, creditors receive a lump-sum payment equal to their share of the surplus and agree to cancel the covenant permanently. Afterwards, the firm continues under shareholders' control, with the loan paying the same coupon C but without any covenants, for as long as shareholders are willing to operate the firm without filing for bankruptcy.

The outline of the model's mechanics is as follows. The firm's debt level is assumed to be exogenously chosen prior to setting the loan's covenant structure. Next, the firm chooses the optimal covenant threshold X_C that maximizes the value of equity, and sets the coupon C so that the loan at issuance is valued at par by the creditors, who evaluate it under the assumption that X_0 is distributed as described above. Once the loan is signed, information asymmetry is removed. If the covenant threshold is set below the bankruptcy boundary that maximizes the value of equity given the coupon, $X_C \leq X_B(C)$, the loan is equivalent to an unprotected loan, and we classify it as cov-lite. In such cases, the loan is outstanding and the firm operates until X_t falls below the bankruptcy boundary, at which point the firm is liquidated. By contrast, if $X_C > V_B$, the loan is protected by the covenant, and the status quo holds until the covenant is violated when X_t falls below X_C. In technical default creditors propose renegotiation as described above, and shareholders accept the proposal in equilibrium. We solve the model numerically to find the covenant threshold, X_C, that maximizes the value of the firm. A detailed discussion of the model's equilibrium and the derivation of the testable hypotheses can be found in Appendix A. Below, we summarize our predictions regarding the relationship between the optimal covenant tightness and various

[10] Specifically, if $V_C \geq F/(1-f)$, the outside option would be the repayment of the loan in full. In this case the renegotiation surplus equals $fF - \kappa V_C$, and creditors' and shareholders' outside-option payoffs are F and $V_C - (1+f)F$, respectively. If $(1-f)V_C < F$ then the firm does not have enough assets to repay the loan and hence the outside option outcome is bankruptcy. In this case, the parties' outside-option payoffs are $(1-\alpha)V_C$ and zero, respectively, and the renegotiation surplus equals $(\alpha - \kappa)V_C$.

model parameters.

3.3. Testable hypotheses

We derive the optimal covenant tightness as a function of leverage, asset volatility, information asymmetry, and renegotiation costs. In this section, we define covenant strictness as $(X_C - X_B)/(\bar{X}_0 - X_B)$, where $X_B \leq X_C \leq \bar{X}_0$. This measure equals 100% for covenants set at the initial level of EBIT, implying immediate violation and technical default. The lower the covenant threshold, X_C, the lower the strictness. If the covenant is set at (or below) the default boundary, X_B, the covenant strictness is equal to zero, meaning that the loan is equivalent to an unprotected loan. Indeed, for such low covenant thresholds technical default will never be observed, because shareholders will choose to bankrupt the firm before the covenant is violated.

Alongside with the optimal covenant strictness we also plot the value of the covenant, which we compute as $\mathbf{v}^P/\mathbf{v}^U - 1$, where $\mathbf{v}^P$ is the ex ante (at $t = 0$) value of the firm if it issues a protected loan with the optimal covenant threshold, and $\mathbf{v}^U$ is the firm value with an unprotected loan with the same coupon. The optimization problem is illustrated in Figure 2, which shows the increase in the firm value as a function of the covenant's strictness, for three levels of leverage. For a low-levered firm, represented by the blue solid line, the value of the covenant is the highest of the three firms. It is hump-shaped and maximized at approximately 60% strictness. The value of the covenant is zero for very tight covenants (strictness in excess of 85%). For asset values that correspond to covenant thresholds in this region the firm is quite safe and the benefits of mitigating information asymmetry are low. At the same time, such tight covenants are violated and have to be renegotiated with a high probability. As a result, their ex ante benefits fall short of the expected renegotiation costs, so the firm prefers not to include a covenant ex ante. But optimal tightness also falls to zero for very loose covenants. This effect arises because if the covenant is set close to the bankruptcy threshold, enforcing it in bankruptcy will be costlier for the creditors than simply waiving the covenant and allowing the firm to continue under creditors' control.

The argument here is exactly the same as in Section 2, with the intuition conveyed by Figure 1. Such covenants would not be enforced by creditors ex post, and therefore are not included in the loan contracts ex ante.

The graph also shows a similar curve for the moderately-levered firm, represented in Figure 2 by the red line. While the shape of the curve is similar, the value of the covenant is lower, and the range of thresholds for which the covenant value is zero is wider. This conforms with the intuition that high leverage deters creditors from enforcing the covenant as they have to internalize more of the costs of the covenant enforcement.

[Insert Figure 2 here]

Finally, a key message conveyed by Figure 2 is that for a firm with sufficiently high leverage, represented in the graph by the green line, the value of the covenant is zero for any strictness, and the optimal strictness is indeterminate. This happens because for such firms there is no covenant threshold under which creditors would have incentives to enforce the covenant in technical default. Thus, the highly levered firm forgoes covenants completely, and issues a cov-lite loan. Note that the covenants' irrelevance in this case means that an unprotected loan is fully equivalent to a protected one with the same coupon rate and any covenant threshold. Both loans should have the same value and the same coupon, and should the firm become distressed, the timing of any bankruptcy and the recovery rates for creditors should be expected to be the same. Covenants that would not be enforced are fully irrelevant ex post and ex ante.

We proceed to report the results of the evaluation of the optimal covenant threshold under different sets of firm parameters. The optimal covenant strictness as a function of leverage and the value of the covenant set at that strictness are both depicted in Figure 3 for four levels of renegotiation costs, κ. All of these graphs are hump-shaped in leverage. At low leverage levels the optimal strictness is relatively low and increases in leverage. This happens because creditors' expected default losses increase with leverage, so setting a tighter covenant in this range creates more value by reducing the debt value discount due to information asymmetry. By contrast, for moderately-levered firms optimal covenant strictness decreases in leverage as the costs of covenant renegotiations increase faster with tightness than the covenant's benefits. As can be expected, the value of the covenant is lower when renegotiation costs are higher, and the optimal covenant strictness is lower, as firms try to avoid setting strict covenants to reduce the present value of renegotiation costs.

[Insert Figure 3 here]

A key prediction of the model is that the covenant value drops to zero when leverage exceeds a certain threshold. Thus, the model rationalizes the emergence of cov-lite loans in the highly levered loan market. The threshold leverage value triggering the absence of covenants is lower when renegotiation frictions are higher, for example, because loan is held by dispersed creditors who would face coordination problems in renegotiations.

The link between renegotiation frictions and the propensity of firms to issue cov-lite loans has recently been discussed by Becker and Ivashina (2016) and Billett, Elkamhi, Popov, and Pungaliya (2016). Our model highlights the role of the costs of enforcing the covenant violation as a key factor that determines creditors' incentives in technical default, which makes covenants irrelevant at high leverage ratios. But Figure 3 shows that for high enough leverage ratios covenants have no value ex ante even when renegotiations are costless ($\kappa = 0$). This may appear surprising in light of the argument above; indeed, creditors will always want to enforce a covenant when renegotiation surplus is positive. However, at high leverage ratios, corresponding to high probabilities of technical default, the costs of enforcement for shareholders exceed the covenant's ex ante benefits. As a result, even though creditors would find covenants valuable, shareholders still choose not to include them, issuing a cov-lite loan instead.

[Insert Figure 4 through Figure 6 here]

The role of renegotiation frictions is further explored in Figure 4, which plots covenant strictness and value as a function of κ for three levels of leverage. Consistent with intuition, the cov-lite region is wider when renegotiation is more costly, and the effect kicks in earlier for highly-levered firms.[11] Empirically, the model predicts that the probability of a loan being cov-lite should be positively correlated with renegotiation costs, while the average covenant strictness should be negatively correlated with it. Also intuitively, Figure 5 shows that higher information asymmetry is predicted to result in stricter covenants, as the benefits of mitigating it increase relative to the costs of covenant enforcement.

Finally, Figure 6 illustrates the effect of the firm's cash flow volatility, which is one of the most important determinants of the loan's default risk. It shows that both covenant values and optimal covenant strictness are slightly decreasing in volatility, but are largely insensitive to it. Moreover, in contrast to leverage, extreme levels of volatility do not trigger covenant irrelevance. Thus, even though both volatility and leverage affect the probability of default, and are commonly combined in distance-to-default type proxies for credit risk, they have a very different effect on covenant strictness and the relevance of covenants; cov-liteness emerges for highly-levered firms but is not predicted to be associated with volatility in any particular way. The distinction between highly levered firms and equally risky low-leverage high-volatility firms allows us to refute the argument that cov-lite loans are issued by risky firms to yield-starved investors. It is specifically high leverage rather than high default risk per se that is predicted to be correlated with the absence of covenants.

4. Empirical analysis of covenant strictness

This section presents the results of our empirical analysis of covenant strictness and the probability of issuing a cov-lite loan using corporate loan data from Thomson Reuters' Dealscan. It is important to emphasize that our goal here is not to establish causal relationships empirically, but rather to test for

[11]Note that even for low-levered firms high enough renegotiation costs can make covenants irrelevant. However, our numerical estimates suggest that this scenario is unlikely for a plausible range of renegotiation costs.

the correlation patterns predicted by our model, in order to establish its empirical relevance.

4.1. Sample description and summary statistics

Each observation in our sample corresponds to a loan package, which may consist of multiple facilities, such as bank credit lines, term loans, etc. We follow Beyhaghi and Ehsani (2016) in removing from consideration all facilities other than term loans.[12] We further retain only US-based non-financial borrowers, and exclude loans not in US dollars or those syndicated outside of the US. We merge the Dealscan data with quarterly Compustat and CRSP using the linking table from Chava and Roberts (2008). We classify a package as cov-lite when it includes loans flagged as cov-lite in Dealscan.

Figure 7 shows the fraction of cov-lite loans among all loans in the sample, as well as among highly-levered loans and those marked investment grade. There are no cov-lite loans in Dealscan prior to 2004, and very few in 2008–2010. They first appear in Dealscan in 2004–2007, but their number during this period is low compared to that reported by Becker and Ivashina (2016) based on the database of levered loans provided by LCD. The proportion of cov-lite loans increases rapidly after 2010, reaching a peak of 50% of all loans in 2017, and declines slightly afterwards. Figure 7 shows that cov-lite loans are rare for investment-grade loans, whereas for highly-levered loans the cov-lite proportion reaches 58% at its peak in 2017.

[Insert Figure 7 and Figure 8 here]

For the borrowers whose financial information is available from Compustat, we calculate *covenant strictness* using the approach proposed by Murfin (2012). This variable measures the ex-ante probability of violating at least one of the covenants included in the loan contract, and takes into account not only the number of covenants but also the distance between the firm's accounting ratios at the time of issuing

[12] First, unlike revolvers, term loans are fully funded at the origination. They are fully reported on the balance sheet of the issuer while it might not be the case for revolvers. Also, as shown in Billett, Elkamhi, Popov, and Pungaliya (2016), revolvers often have covenants even when they are issued as part of a package that include cov-lite loans. Violations of revolver covenants in such cases do not trigger cross-default on cov-lite term loans in the same package.

the loan and the covenant threshold (slack), scaled by the volatility of those ratios.[13] The strictness is set to zero for loans flagged as cov-lite in Dealscan.

Figure 8 plots the average covenant strictness as well as the average number of covenants per loan over time. Both measures of the strength of covenant protection decline steadily between 2000 and 2017, except for the brief period during and immediately after the financial crisis, which saw a temporary tightening of covenants. A more detailed look at the data reveals that the main reason behind the decrease in the average covenant tightness has been the rise of cov-lite loans documented in Figure 7. By contrast, for those loans that do include financial covenants their strictness has remained relatively stable throughout this period.

Table 1 reports summary statistics for our sample. The Dealscan database flags a total of 739 loans as cov-lite. Panel A of Table 1 provides the statistics for the entire sample. The average (median) loan size is \$740.00 (\$310.00) million and the average (median) firm total assets is \$4.58 (\$1.23) billion. In Panel B of Table 1, we provide summary statistics for the sub-sample of cov-lite and loans with covenants ("cov-heavy" loans). Consistent with Billett, Elkamhi, Popov, and Pungaliya (2016), we find that cov-lite loans are larger than cov-heavy ones. The average (median) loan size for cov-lite loans is \$1,500 (\$920) million compared to average (median) loan size for cov-heavy loans of \$650 (\$260) million. Firms issuing cov-lite loans are also large, with an average (median) value of total asset of \$6.08 (\$3.17) billion compared to \$4.40 (\$1.03) billion for firms that issue loans with covenants. Our sample also shows a marked difference in leverage for issuers of cov-lite versus cov-heavy loans. The average (median) leverage for the former is 0.46 (0.47), a value that is considerably higher than cov-heavy loans which exhibit an average (median) of 0.37 (0.36).

[Insert Table 1 here]

[13] The slack is appropriately scaled, and we account for the covariances between various financials restricted by the covenants. For details on the construction of this variable, see Murfin (2012).

4.2. Covenant strictness and leverage

As illustrated in Figure 3, our model predicts that the optimal covenant strictness should be increasing in leverage for moderate levels, and then go to zero as creditors stop enforcing covenant violations above a certain leverage threshold, which in turn causes shareholders to stop including covenants in the loan package. Figure 9a shows that this is exactly what we see in the data. This figure plots the median covenant strictness and the proportion of cov-lite loans by the decile of leverage in the sample. Strictness is very low for low-levered firms but increases with leverage, first rapidly and then at a slower rate. It starts to decline at above-median leverage, and goes to zero for the top three leverage deciles. The dashed line in the graph plots the proportion of cov-lite loans, and confirms that more than half of the loans in the top three deciles of leverage are cov-lite.

[Insert Figure 9a and Figure 9b here]

Figure 9b plots the median covenant strictness separately for loans for which renegotiation frictions are likely to be high versus low. Our model predicts that high renegotiation costs make covenant enforcement undesirable for creditors, giving rise to the emergence of cov-lite loans. Therefore, we expect the threshold leverage ratio above which loans become cov-lite to be wider for firms with high renegotiation costs, as illustrated in Figure 3. To test this prediction, we follow Billett, Elkamhi, Popov, and Pungaliya (2016) and proxy renegotiation costs by the fraction of the loan package comprised of Term B loans, *Term B percentage = Term B/(Term A + Term B)*. In contrast to Term A tranches, which are held by banks, Term B tranches are held by institutional investors who are likely to face coordination issues in renegotiations. Thus, we classify loans with the *Tranche B percentage* above (below) as high (low) renegotiation-cost loans.

Figure 9b shows that for loans for which renegotiation costs are likely to be high covenant strictness is hump-shaped in leverage, and equals zero for leverage deciles six through ten. The relationship between strictness and leverage for such firms conforms with the theoretical curve depicted in Figure 3 for low-to-medium renegotiation costs quite well. By contrast, for the subsample of loans with low renegotiation costs covenant strictness is higher for each leverage decile, which is again consistent with the model's prediction. For these firms the median strictness does not go to zero even for top leverage deciles, though unreported statistics show that the proportion of cov-lite loans does increase with leverage for this group also.

Overall, the results so far confirm that covenant strictness is hump-shaped in leverage, and is equal to zero for high enough leverage ratios and renegotiation costs. We proceed to confirm that this relationship holds in the presence of various controls, and also look at how strictness and the propensity to issue cov-lite loans is correlated with other firm characteristics.

4.3. Regression results

4.3.1. Covenant strictness and cov-lite status

In this section, we present regressions of covenant strictness and the probability of a loan being cov-lite. In all our regressions we control for industry and year fixed effects, as well as for the firm's size, market-to-book, profitability, and the volatility of equity.

Table 2 reports the regressions of covenants' strictness. We first focus on the relation between strictness and leverage. Our model's prediction that strictness is hump-shaped in leverage implies that it should be negatively related to leverage squared. As can be seen from the regression analysis, this is indeed what we find empirically. While leverage is positively correlated with strictness, the coefficient on leverage squared is negative, robust, and highly statistically significant. Thus, the hump-shaped relationship illustrated in Figure 9a is robust to the inclusion of various controls, including industry and time fixed effects.

Another important result in Table 2 is that strictness is negatively correlated with the proportion of Term B loans in the loan package, which is our proxy for loan renegotiation costs. Again, this is consistent with expectations: when renegotiating the loan contract in technical default is difficult, creditors are more likely to simply wave the covenant rather than attempt to enforce it. Anticipating this behavior, firms would then issue cov-lite loans ex ante, so that the average loan strictness would be negatively correlated with renegotiation frictions. The strongly significant negative correlation between covenant strictness and *Tranche B percentage* is consistent with this theory.

Regressions (4) and (5) include as an independent variable the dispersion of analysts' forecasts of the borrowing company's earnings, which we construct using analyst data from IBES. We expect this variable to be positively related to the degree of information asymmetry about the value of the firm's assets, and hence the severity of the potential adverse selection problem in raising capital. Our model predicts that when information asymmetry is high, a moderately-levered firm should be able to reassure creditors by setting covenants tightly enough to ensure that the firm would be solvent in possible technical default. Based on this argument, we expect higher information asymmetry to result in tighter covenants. Indeed, in Table 2 the coefficient on *Analyst disagreement* is positive, which is consistent with this intuition, suggesting that higher information asymmetry is associated with tighter covenants.

Additional regression results are provided in Table 3, which has the same structure as Table 2 but uses as the dependent variable the dummy that equals one for cov-lite loans. The results of these regressions mostly mirror those reported above. Specifically, higher renegotiation frictions are positively related to the loan being cov-lite, whereas the degree of asymmetric information is negatively related to it. Firms that issue cov-lite loans are also likely to be larger, more profitable, and have lower market-to-book ratios. Of note, even though leverage was previously documented to be positively correlated with strictness, it is also positively correlated with the probability of the loan being cov-lite. This apparent contradiction is explained by the fact that strictness is non-monotonic in leverage, but no such relationship is apparent for cov-liteness in Table 3 once we control for variables other than leverage. Both of these findings are consistent with our model, which predicts that highly levered firms should issue cov-lite loans and also that strictness, but not the cov-lite dummy, should be hump-shaped in leverage.

[Insert Table 2 and Table 3 here]

To summarize, consistent with the model, we find covenant strictness to be hump-shaped in the firm's leverage, while the probability of issuing a cov-lite loan is increasing in leverage. Cov-lite loans are associated with lower information asymmetry and are often bought by dispersed institutional investors for whom renegotiation costs are likely to be higher. Finally, we also document that the increased use of cov-lite loans has been accompanied by an increase in leverage by firms that issue syndicated loans, consistent with the link between the two emphasized by our model.

5. Are cov-lite loans riskier?

5.1. Default rates and recovery rates

Our explanation for the rise of cov-lite loans is based on the argument that even when covenants are present, creditors would ignore their violations in financial distress, and the firm would not default until it reaches the default threshold that shareholders would chose in the absence of covenants. This argument implies that the probability that a loan ends up in default and the recovery rate for creditors conditional on default should be similar for cov-lite and otherwise similar cov-heavy loans.

To check these prediction empirically, we first merge our data on loans in Dealscan with the information about defaults in the comprehensive Default & Recovery Database (DRD) from Moody's. For each loan issued after 2000 with the firm's financial information available from Compustat, we manually check whether Moody's recorded any defaults on the loan while it was outstanding. We then regress the probability of default on the firm's leverage and other factors that affect the probability of default, as well as on the dummy variable identifying cov-lite loans.

The results of these regressions are reported in Table 4. Column (1) shows that the probability of default for an average cov-lite loan is 0.59% higher that that for an average cov-heavy loan. The higher average default probability should be unsurprising in light of the fact that it is highly levered firms that issue cov-lite loans. Column (2) demonstrates that once we control for the leverage ratio, the difference between cov-lite and cov-heavy loans declines by half and becomes statistically insignificant. Thus, it is the high leverage rather than the absence of covenants that explains the differences in the probability of default. Of note, column (3) shows that even though volatility is strongly related to the probability of default, controlling for volatility has no effect on the significance of the cov-lite dummy. This finding is consistent with our argument that it is high leverage that is associated with the use of cov-lite loans, rather than high default risk overall.

[Insert Table 4 and Table 5 here]

Next, we study recovery rates on defaulted cov-lite loans using the Ultimate Recovery Database (URD) from Moody's, which is part of the DRD. To this end, we manually identify all defaulted loans marked as cov-lite either in Dealscan, in LCD (before 2012), or in URD, for which data on recovery rates at default resolution are available.[14] Moody's estimates these 'ultimate recoveries' based either on the value of the settlement instruments at or close to the emergence from default, or based on the trading price of the loan at resolution; under both approaches it discounts the nominal recovery to the date of default at the loan interest rate.

Our final sample consists of 119 cov-lite facilities, of which 103 are term loans and 16 are revolvers (credit lines), and a control sample of 895 cov-heavy term loans and 881 revolvers. While the sample size is relatively modest, we believe it to be the most comprehensive data set of recovery rates on cov-lite loans assembled to date; no academic study that we are aware of has attempted to quantify default losses on cov-lite loans.

We find the mean (median) recovery rate across all cov-lite facilities to be 56.7% (55.6%), compared

[14]Thus, in these tests we are not limiting our sample to loans of public companies linked to Compustat. We do so primarily to maximize the sample size, given that only a limited number of cov-lite loans have defaulted to date and have estimates of recovery rates at emergence readily available.

with 76% (100%) for cov-heavy loans. While these statistics imply that cov-lite loan holders sustain much higher losses in default than other loan investors, they hide substantial differences between the characteristics of cov-lite and cov-heavy credit facilities. Firstly, term loans are over-represented in the cov-lite sample relative to the control sample, and have lower recovery rates than revolvers. Secondly and more importantly, defaulted cov-lite loans are substantially less collateralized. As many as 85.5% of cov-heavy loans are protected by a first lien on the firm's assets. By contrast, only 48.7% of cov-lite loans are first-lien loans, while the proportion of loans ranked third and below (12.6%) is about 4.5 times that for cov-heavy loans. Our regression analysis suggests that the differences in recovery between cov-lite and cov-heavy loans are largely explained by these contractual differences.

The regression estimates are reported in Table 5. Columns (1) and (2) show that cov-lite facilities recover 19.5% less on average, and that the difference decreases to 14.1% but remains significant after controlling for the differences between term loans and revolving credits. But as can be seen from column (3), controlling for the loan's collateral rank cuts this difference by half and renders it insignificant. With both the collateral rank and the facility type, the coefficient on the cov-lite dummy decreases to under five percentage points. It is worth noting the dramatic decline in recovery rates that accompanies the decline in the collateral rank evident from the estimates in columns (3) and (4), which shows that second-lien loans recover 28% less than first-lien loans, and third- and below-lien loans recover as much as 50% less. Overall, these regressions suggest that it is not the presence or absence of covenants but rather other contractual differences between the average cov-lite and cov-heavy loan, and in particular the differences in collateralization, that are responsible for the observed differences in average recovery rates.

Another, more technical factor that contributes to the difference in average recovery rates is that a disproportional number of estimates are calculated using trading loan prices rather than the settlement method that Moody's uses most frequently. Because the average settlement-based loan recovery rate in URD of 77%, compared with 63% for the average trading-price recovery, this bias results in lower overall estimates for cov-lite loans.[15] Column (5) of Table 5 shows that once we add a dummy variable for recovery estimates that are based on trading prices, the difference between cov-lite and cov-heavy loans becomes close to zero.[16]

Overall, default frequencies and recovery rates for cov-lite loans appear to be similar to those for cov-heavy loans once we control for key factors such as the firm's leverage and the loan's collateral. These findings reinforce our argument that the absence of maintenance covenants is of little consequence in financial distress, and does not affect the timing of the firm's default or the ultimate recovery for creditors.

Given that loan losses from default are similar for cov-lite and cov-heavy loans, it is reasonable to also expect no differences between loan yield spreads ex ante. This is indeed what we find empirically in untabulated tests when we regress the loan spread at issuance on the cov-lite dummy while controlling for leverage and collateral status. We do not report these regressions because the cov-lite status and the loan spread are determined simultaneously in equilibrium at the time when the loan contract is signed, and the causal effect of the lack of covenants is difficult to identify. In the next subsection we provide indirect evidence on this matter by comparing *index* returns on bonds and levered loans over time.

5.2. Levered loan spreads over time

Our model suggests that for highly levered firms maintenance covenants are not relevant because they do not add value for either equityholders or debtholders. Therefore, we predict that for highly levered firms – such as those that access the leveraged loan market – the removal of covenants would not lead to higher yields and ultimately returns for debtholders. However, there is an alternative view

[15] One potential reason for the bias towards trading price-based recovery estimates in the cov-lite loan sample may be that this method appears to be more commonly used for less collateralized loans.

[16] If the market for defaulted loans is illiquid, recovery estimates based on trading prices may be biased downwards. Notably, the marked difference between ultimate recovery rates estimated using the settlement method and the trading price method is characteristic of the defaulted loans, but not of the defaulted corporate bonds. It is also worth noting that recovery rates at the time of default are commonly measured as the debt instrument's trading price 30 days after default. While standard for corporate bonds, these estimates are much less likely to be available in DRD for defaulted loans. These features of the data should be kept in mind when interpreting recovery rate statistics reported by rating agencies.

according to which investors are willing to forego covenants in exchange for higher yields (Stein, 2013). Because of a decrease in the short term rates, investors might buy riskier assets in an attempt to reach for yield (Becker and Ivashina, 2015) which would explain the increase in the proportion of cov-lite loans from 2008 to 2017. We argue that if this is the case, we should observe a larger difference between loan and bond returns when there is an increase in the proportion of cov-lite loans. Our empirical results demonstrate that this is not the case.

We compare the returns of two indices that capture the broad US leveraged loan market with the return of an index of investment grade bonds. The intuition is simple. The leveraged loan market has experienced a shift from cov-heavy to cov-lite issuance in recent years while the market for investment grade bonds has not. Therefore, controlling for time-fixed-effects, changes in the return differential between a loan and a bond index should reflect changes in the loan market.[17] Our result provide empirical evidence in support of the hypothesis that the increase in the proportion of cov-lite loans has not changed the performance of the loan market on average with respect to bonds.

We use two indices for the loan market: the S&P / LSTA Leveraged Loan Index and the Markit iBoxx USD Leveraged Loans Index. For the S&P 500 Investment Grade Corporate Bond Index. All 3 indices are sourced from Bloomberg. We define the *Loan/Bond spread (S&P)* as the spread between the total return of the S&P / LSTA Leveraged Loan Index minus the total return of the S&P 500 Investment Grade Corporate Bond Index. Similarly, the *Loan/Bond spread (Markit)* is defined as the spread between the total return of the the Markit iBoxx USD Leveraged Loans Index minus the total return of the S&P 500 Investment Grade Corporate Bond Index. Our data span the period January 2000 through July 2020. Figure 10 plots the *Loan/Bond spread (S&P)* over time. With the exception of the 2008-2009 financial crisis, the spread is stable around zero and it does not show an increase in recent years when cov-lite loans have become much more prevalent in the leveraged loan market. Even during the recent crisis caused by

[17] For the purpose of this paper, we are only interested in whether there is a change in the loan-bond return spread. We do not investigate the potential causes such as an increase in risk in the loan market.

the COVID-19 pandemic the spread seems to have remained stable.

In Table 6 we regress the average return spreads on the proportion of cov-lite loans issued in a given period (variable *Avg Covlite*).

[Insert Table 6 and Figure 10 here]

Panel A shows the results where we average the data at a quarterly frequency. In Columns (1) and (3) we regress the average loan/bond spreads (*Loan/Bond spread (S&P)* and *Loan/Bond spread (Markit)*) on *Avg Covlite*. In Columns (2) and (4), we run the same regressions with the addition of year-fixed effects to control for time-trends. Panel B presents the same regression when data are averaged at a monthly frequency. In all columns and both panels, the coefficient of *Avg Covlite* is not statistically different from zero thus showing that there is no correlation between the proportion of cov-lite loans and the loan/bond return spread. Overall our results suggest that the relative returns of loan and bond, on average, has remained constant over time despite the increase in the proportion of cov-lite loans.

6. Summary and conclusions

This paper shows that if a highly levered firm violates a financial covenant, its creditors may have no incentives to enforce it, because waiving the covenant and allowing the firm to continue under the status quo may result in a higher value for creditors than enforcing the covenant violation. As a result, the absence of covenants is irrelevant for firms with leverage ratios above a certain threshold, which is inversely related to the costs of renegotiating with creditors are high. Consistent with this argument, we find that cov-lite loans are no more likely to end up in default that other loans of similarly levered firms, and that when they do default, recovery rates are not statistically different from those on other loans with similar characteristics.

In contrast with highly levered firms, firms with moderate amounts of debt may find covenant-protected loans beneficial. Indeed, if the firm is expected to be solvent in technical default, creditors can be assured of full loan repayment should they decide to enforce the covenant. This makes the loan essentially risk-free even if creditors are unsure of the firm's true financial health. As a result, for moderately-levered firms covenants can reduce the costs of financing by mitigating the adverse selection problem in corporate borrowing.

We derive the optimal covenant strictness using a dynamic structural model with asymmetric information, and predict it to be hump-shaped in leverage. We also highlight the difference between leverage and volatility, both of which affect credit risk, for the optimality of covenants. Overall, our findings suggest that while covenants are likely to remain relevant for investment grade firms, the widespread concerns about the dominance of cov-lite loans in the levered market segment may well be misplaced: The absence of covenants may be inconsequential for these firms in financial distress ex post, as well as irrelevant for loan yields ex ante.

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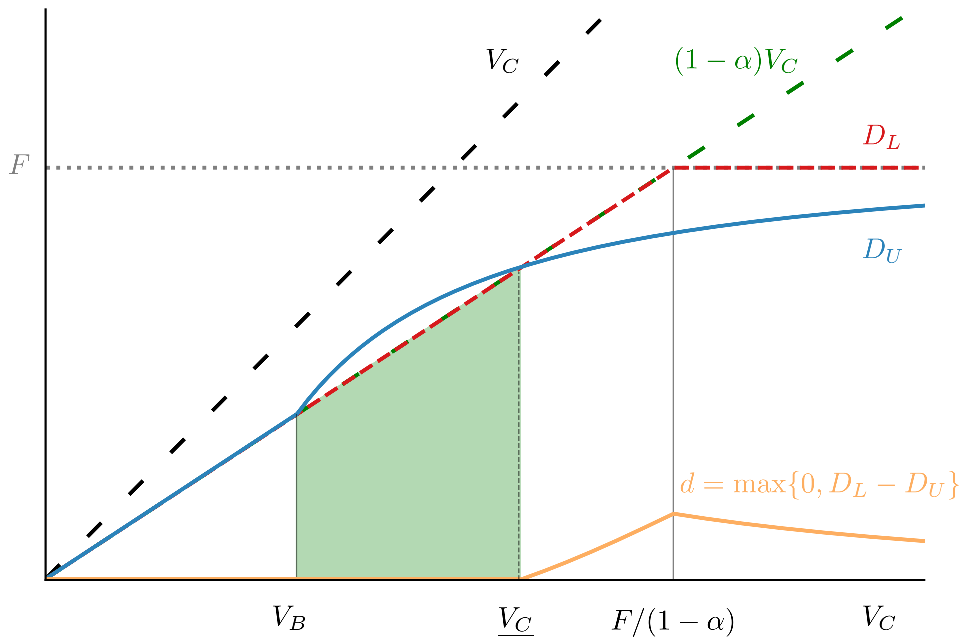

Fig 1. Creditor's payoffs in technical default. This graph shows the liquidation value of debt under covenant enforcement (D_L) as a function of the value of the firm's assets in technical default (V_C), and compares it with the unprotected loan (D_U).

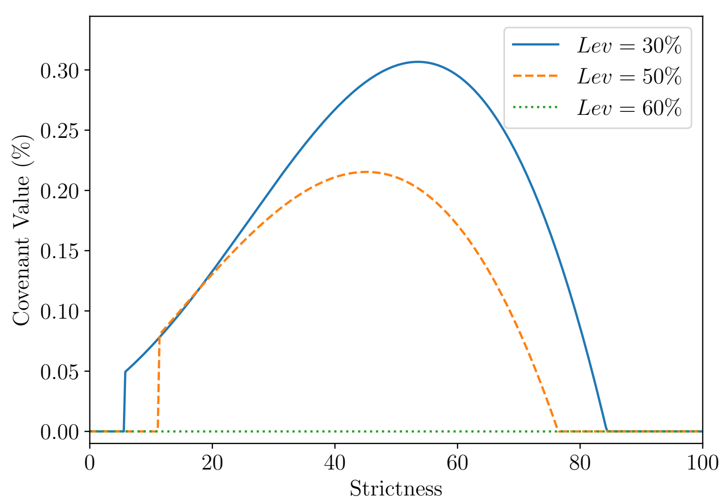

Fig 2. This graph shows covenant value as a function of strictness. Covenant Value is defined as the percentage increase in firm value when the debt is protected (i.e. $\mathbf{v}^P/\mathbf{v}^U - 1$ where $\mathbf{v}^P$ is firm value when debt is protected and $\mathbf{v}^U$ is firm value when debt is unprotected). Strictness is defined as $100 \times (X_C - X_B)/(X_0 - X_B)$: this is a proxy that varies between 0 and 100. We vary strictness, and we solve for the optimal coupon that yields a specified leverage (30%, 50% or 60%). The parameters are set as follows: $X_t = 6.0$, $X_0 = 5.0$, $\gamma = 0.5$, $\mu = 0.02$, $r = 0.04$, $\sigma = 0.2$, $\alpha = 0.1$, $\eta = 0.5$, $\kappa = 0.0$, $\tau = 0.15$, $f = 0.03$.

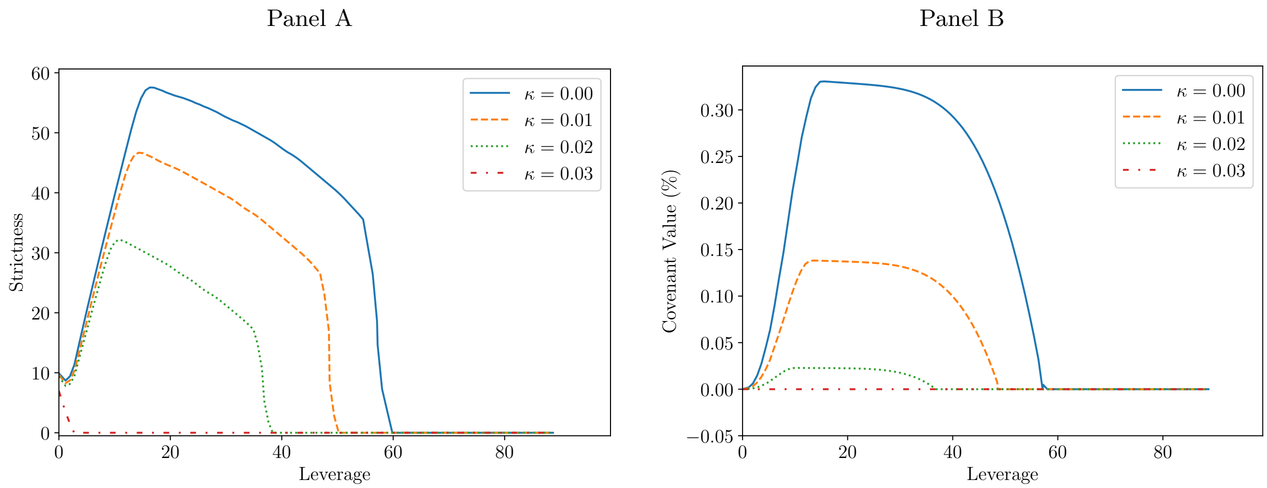

Fig 3. Strictness and covenant value vs. leverage. This graph shows covenant strictness and covenant value as a function of leverage for different values of renegotiation costs (κ). Strictness is defined as $100 \times (X_C - X_B)/(X_0 - X_B)$. Covenant value is defined as the percentage increase in firm value when the debt is protected (i.e. $\mathbf{v}^P/\mathbf{v}^U - 1$ where $\mathbf{v}^P$ is firm value when debt is protected and $\mathbf{v}^U$ is firm value when debt is unprotected). The parameters used to solve the model are: $X_t = 6.0$, $X_0 = 5.0$, $\gamma = 0.5$, $\mu = 0.02$, $r = 0.04$, $\sigma = 0.2$, $\alpha = 0.1$, $\eta = 0.5$, $\tau = 0.15$, $f = 0.03$.

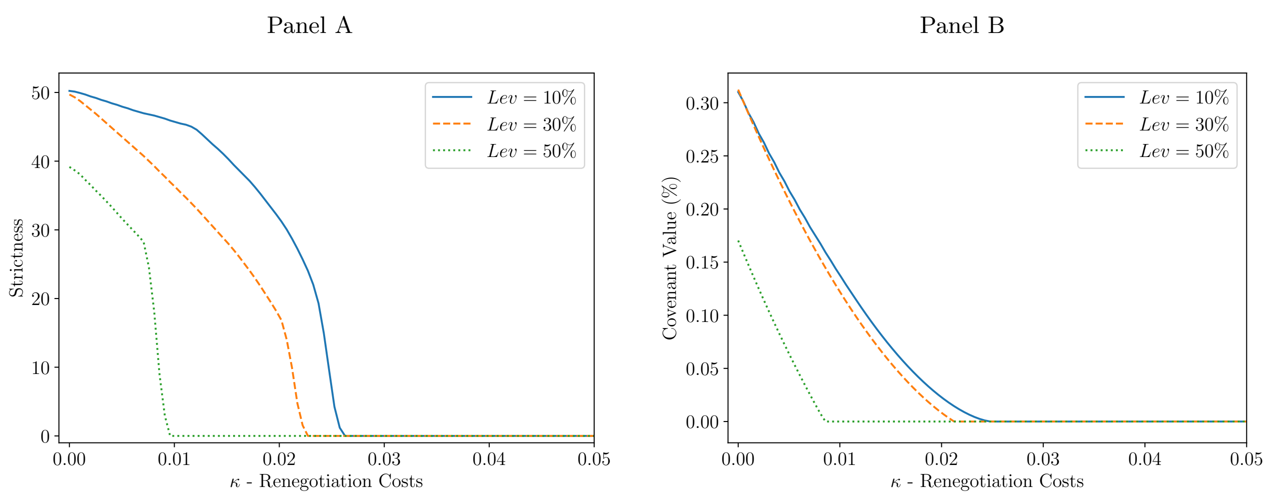

Fig 4. Strictness and covenant value vs. renegotiation costs. This graph shows covenant strictness and covenant value as a function of renegotiation costs (κ) for different values of leverage. Strictness is defined as $100 \times (X_C - X_B)/(X_0 - X_B)$. Covenant value is defined as the percentage increase in firm value when the debt is protected (i.e. $\mathbf{v}^P/\mathbf{v}^U - 1$ where $\mathbf{v}^P$ is firm value when debt is protected and $\mathbf{v}^U$ is firm value when debt is unprotected). The parameters are set as follows: $X_t = 6.0$, $X_0 = 5.0$, $\gamma = 0.5$, $\mu = 0.02$, $r = 0.04$, $\sigma = 0.2$, $\alpha = 0.1$, $\eta = 0.5$, $\tau = 0.15$, $f = 0.03$.

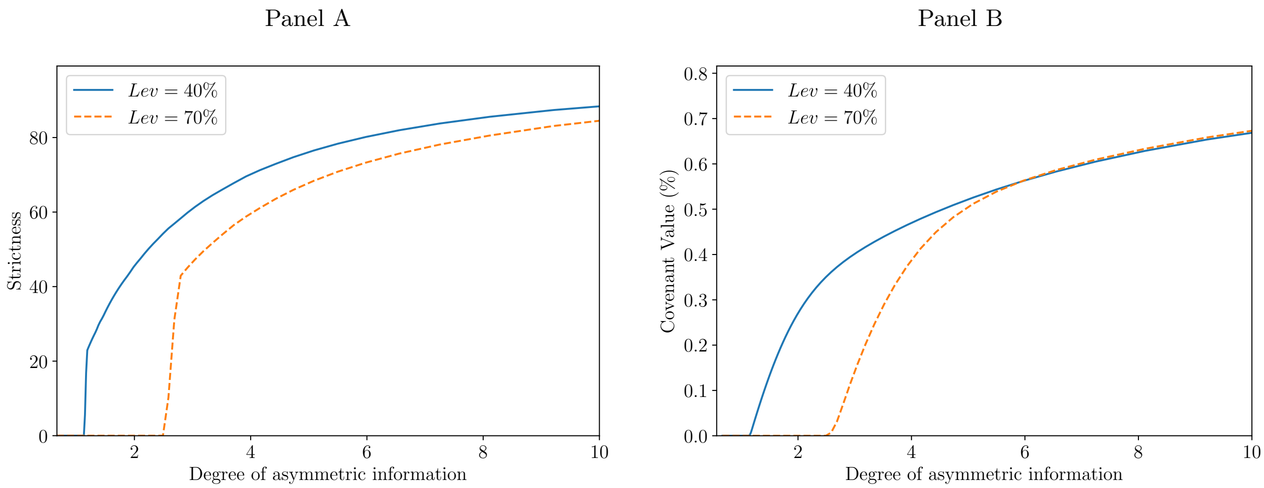

Fig 5. Strictness and covenant value vs. asymmetric information. This graph shows covenant strictness and covenant value as a function of asymmetric information (γ). Strictness is defined as $100\times(X_C-X_B)/(X_0-X_B)$. Covenant value is defined as the percentage increase in firm value when the debt is protected (i.e. $\mathbf{v}^P/\mathbf{v}^U - 1$ where $\mathbf{v}^P$ is firm value when debt is protected and $\mathbf{v}^U$ is firm value when debt is unprotected). The parameters are set as follows: $X_t = 6.0$, $X_0 = 5.0$, $\mu = 0.02$, $r = 0.04$, $\sigma = 0.2$, $\alpha = 0.1$, $\eta = 0.5$, $\kappa = 0.0$, $\tau = 0.15$, $f = 0.03$.

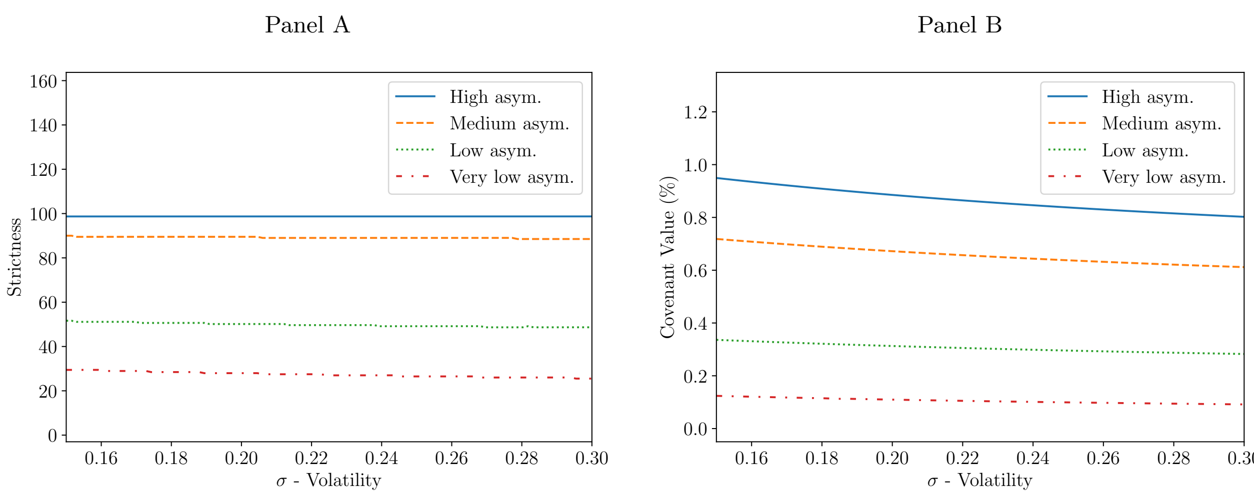

Fig 6. Strictness and covenant value vs. volatility. This graph shows covenant strictness and covenant value as a function of unlevered assets' volatility σ for different levels of asymmetric information. Strictness is defined as $100 \times (X_C - X_B)/(X_0 - X_B)$. Covenant value is defined as the percentage increase in firm value when the debt is protected (i.e. $\mathbf{v}^P/\mathbf{v}^U - 1$ where $\mathbf{v}^P$ is firm value when debt is protected and $\mathbf{v}^U$ is firm value when debt is unprotected). The parameters are set as follows: $X_t = 6.0$, $X_0 = 5.0$, $\mu = 0.02$, $r = 0.04$, $\alpha = 0.1$, $\eta = 0.5$, $\kappa = 0.0$, $\tau = 0.15$, $f = 0.03$.

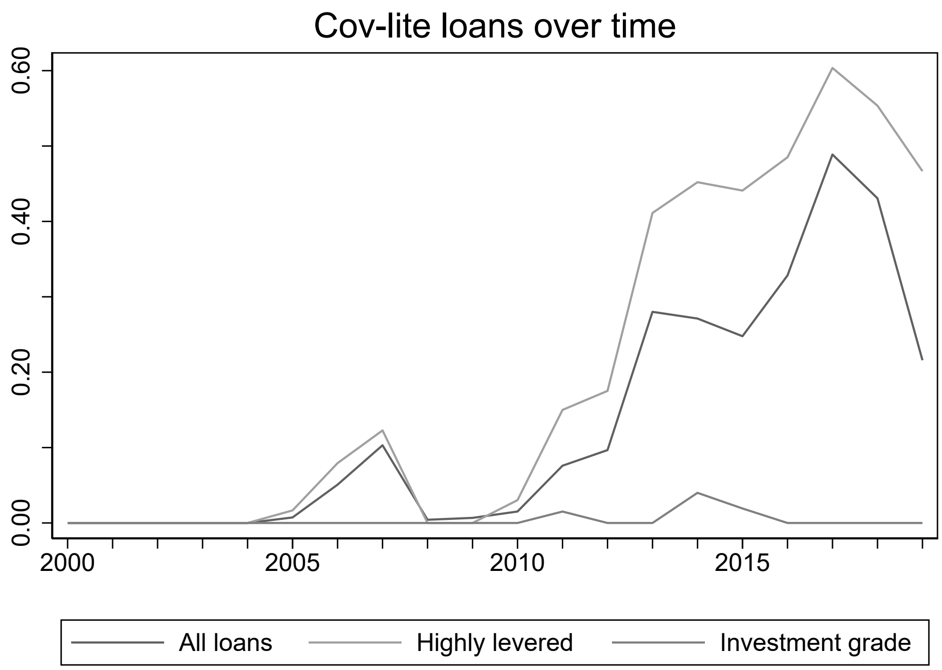

Fig 7. Cov-lite loans over time. This graph shows the fraction of loans in DealScan marked as cov-lite, for the full sample and also for loans marked as Highly Levered and Investment Grade in Dealscan.

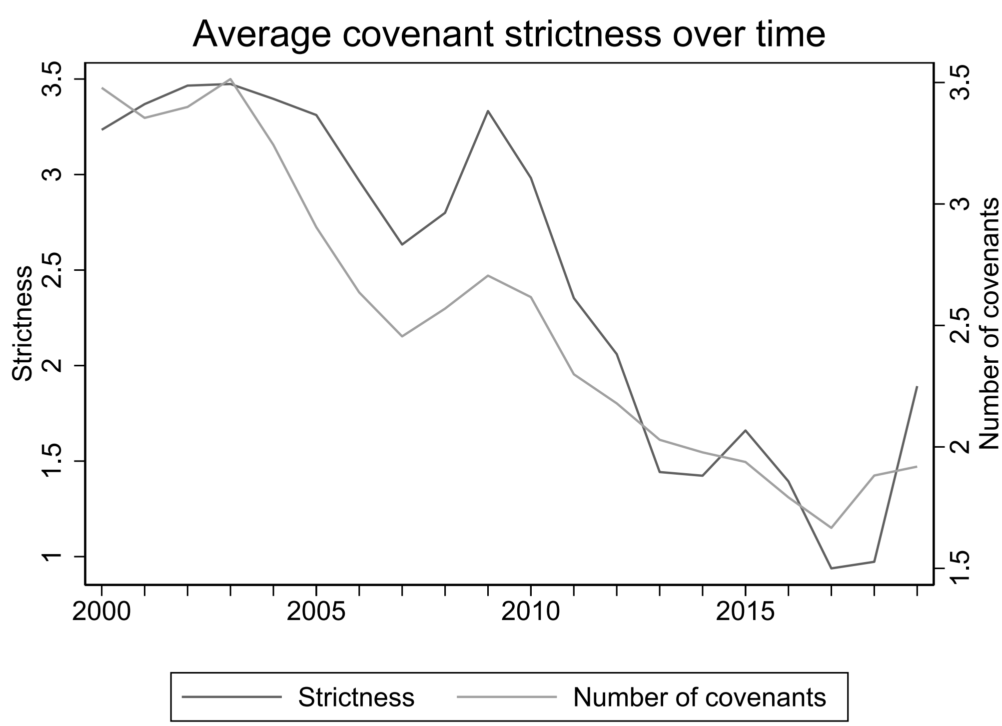

Fig 8. Average covenant strictness over time. This graph shows the average covenant strictness as well as the average number of covenants per loan over time. Covenant strictness is a loan-specific measure calculated according to the methodology in Murfin (2012). The graph plots the average covenant strictness (left axis) and the average number of covenants (right axis) within a given year for the full sample.

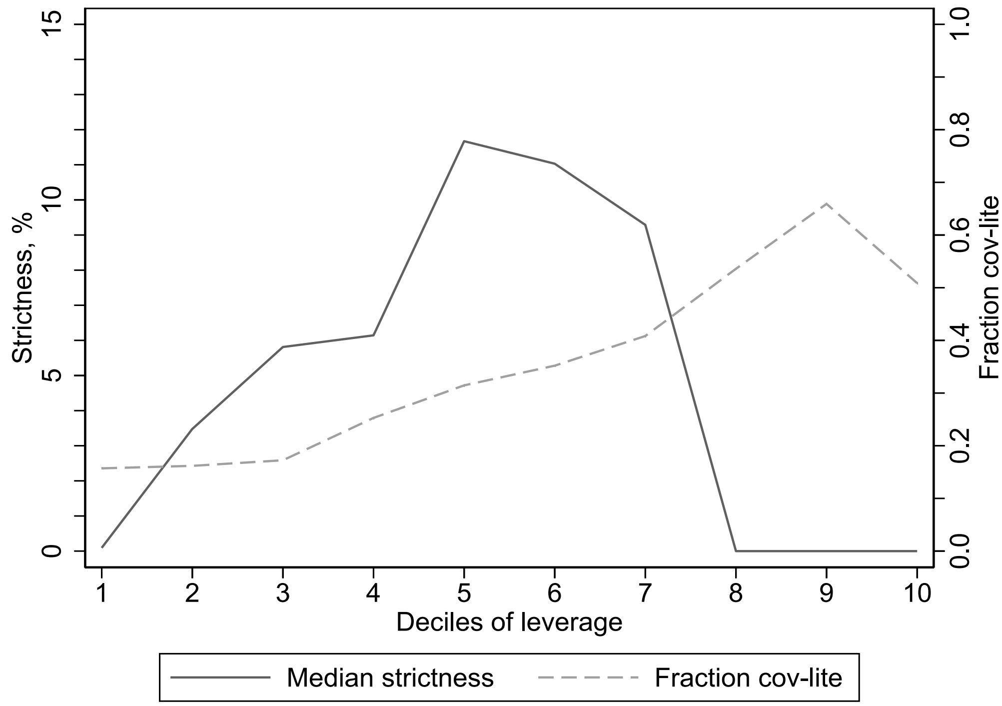

Fig 9a. Cov-lite loans and strictness vs. leverage. This graph shows the median covenant strictness and the proportion of cov-lite loans within each. Covenant strictness is a loan-specific measure calculated according to the methodology in Murfin (2012).

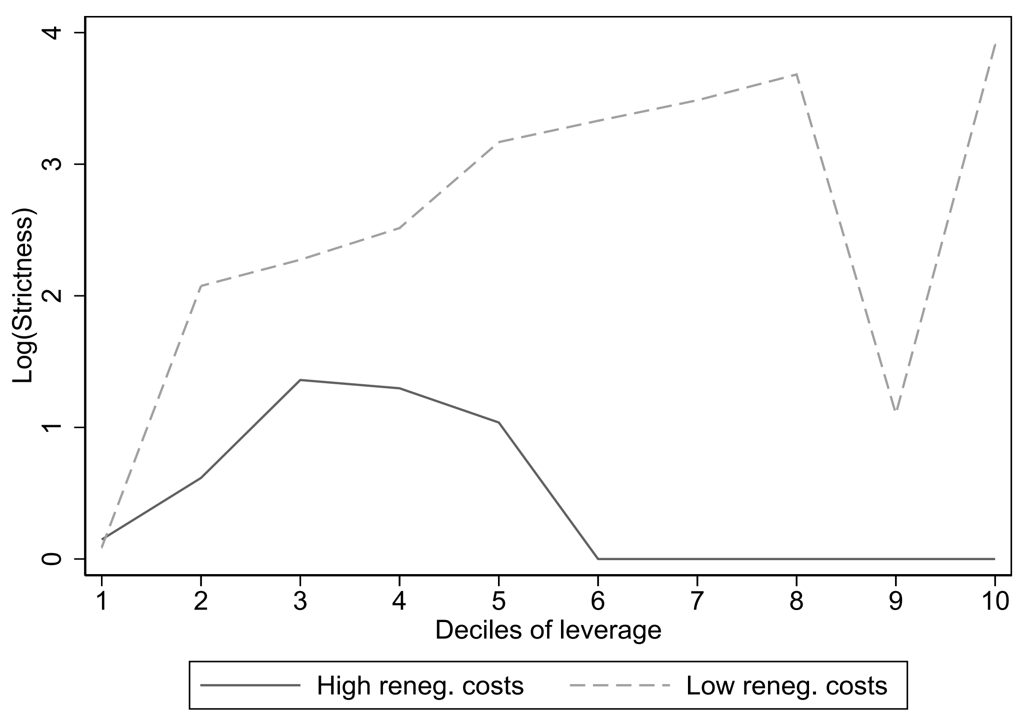

Fig 9b. The role of renegotiation costs. This graph shows median covenant strictness by decile of leverage separately for a subsample of loans for which renegotiation costs are likely to be high vs low, classified by whether the proportion of Term B loans in the package is above or below its sample median. The sample consists of all loan packages in Dealscan issued after 2008 by US borrowers that include at least one term loan.

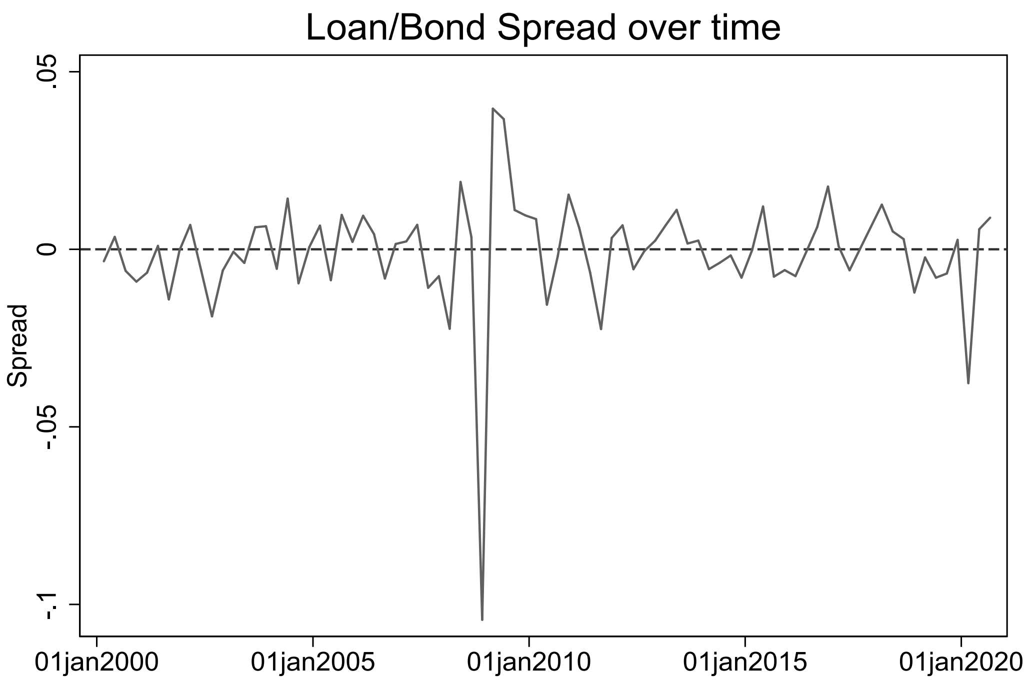

Fig 10. Loan/Bond Return Spread over time. This graph shows the return spread between the index of leverage loans (S&P / LSTA Leveraged Loan Index) and the index of investment grade bonds (S&P 500 Investment Grade Corporate Bond Index).

Table 1

Summary Statistics

This table provides descriptive statistics for the sample of 6,539 loans from January 2000 to December 2019. A detailed description of the variables is provided in Appendix B. Panel A provides the descriptive statistics for the entire sample. Panel B provides the summary statistics for the subsample cov-lite loans and the subsample of loans with covenants ("cov-heavy loans").

PANEL A

		All loans				
Variables	**N.Obs.**	**Mean**	**Std.Dev.**	**25%**	**Median**	**75%**
Loan_Size	6,539	740.00	1,500.00	100.00	310.00	800.00
Total Assets **(Billions)**	6,129	4.58	18.06	0.38	1.23	3.47
Leverage	6,114	0.38	0.18	0.25	0.38	0.51
Strictness	3,908	31.17	28.80	0.13	28.39	54.50
Num. Lenders	6,527	7.95	10.73	2.00	5.00	10.00
Volatility	5,079	0.49	0.31	0.30	0.40	0.58
Analyst Disagreement	4,130	0.64	5.44	0.04	0.12	0.33
Tranche B Perc.	6,538	0.80	0.38	0.84	1.00	1.00
Market-to-Book	5,586	1.62	0.98	1.09	1.38	1.83
Profitability	6,357	-10.49	815.05	-0.02	0.02	0.07

PANEL B

	cov-heavy loans					cov-lite loans				
Variables	**Mean**	**Std.Dev.**	**25%**	**Median**	**75%**	**Mean**	**Std.Dev.**	**25%**	**Median**	**75%**
Loan_Size	650.00	1,500.00	85.00	260.00	680.00	1,500.00	1,700.00	490.00	920.00	1,900.00
Total Assets **(Billions)**	4.40	18.75	0.33	1.03	3.00	6.08	10.94	1.68	3.17	6.51
Leverage	0.37	0.19	0.24	0.36	0.50	0.46	0.16	0.35	0.47	0.57
Strictness	38.43	27.26	10.19	43.94	59.64	0.00	0.00	0.00	0.00	0.00
Num. Lenders	8.06	11.18	2.00	5.00	10.00	7.16	6.18	3.00	6.00	9.00
Volatility	0.51	0.31	0.31	0.42	0.60	0.36	0.22	0.27	0.33	0.40
Analyst Disagreement	0.66	5.81	0.04	0.12	0.33	0.52	1.85	0.05	0.12	0.31
Tranche B Perc.	0.78	0.39	0.71	1.00	1.00	0.95	0.17	1.00	1.00	1.00
Market-to-Book	1.62	1.01	1.08	1.36	1.83	1.63	0.63	1.20	1.51	1.89
Profitability	-11.83	865.62	-0.02	0.03	0.07	0.00	0.34	-0.02	0.02	0.06

Table 2

Regressions of covenant strictness

The dependent variable is the measure of strictness, which is calculated according to the methodology in Murfin (2012). The independent variables are as follows: *Leverage* is the firm's leverage ratio, $Leverage^2$ consists of the residuals of a regression of the square of *Leverage* on *Leverage*, $TrancheBperc.$ is the percentage of institutional term loan (Term B), *Analyst disagreement* is the deviation of the analysts' estimates from the true value of earnings per share, $Volatility$ indicates the volatility of equity, *Market-to-Book* is the market-to-book ratio, $Profitability$ indicates the profitability ratio defined as net income before extraordinary items over sales, $logTA$ is the logarithm of total assets. Appendix B provides a detailed description of the variables. Standard errors are clustered by industry and year. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Leverage	7.89**	16.47***	22.44***	16.41***	22.77***
	(3.10)	(3.94)	(3.81)	(4.03)	(3.90)
$Leverage^2$	-12.80***	-12.83***	-12.81***	-11.58**	-12.00***
	(3.34)	(4.69)	(4.47)	(4.65)	(4.42)
Tranche B perc.			-12.68***		-12.90***
			(1.63)		(1.66)
Analyst disagreement				17.22***	14.98***
				(2.26)	(2.43)
Volatility		8.19**	12.06***	8.07	12.41**
		(4.15)	(4.17)	(5.22)	(5.30)
Market-to-book		-4.87***	-5.67***	-4.35***	-5.08***
		(0.86)	(0.84)	(0.89)	(0.87)
Profitability		-10.19**	-10.36**	-14.43***	-14.69***
		(4.37)	(4.26)	(5.01)	(4.97)
Log(Assets)		-2.85***	-3.31***	-2.45***	-2.81***
		(0.56)	(0.56)	(0.65)	(0.64)
Constant	15.93***	40.02***	49.41***	35.43***	43.68***
	(1.39)	(5.78)	(5.81)	(6.60)	(6.54)
Observations	1,971	1,664	1,664	1,517	1,517
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Table 3

Regressions of the cov-lite status

The dependent variable is the indicator variable for cov-lite loans multiplied by 100 (*cov_lite* × 100). The independent variables are as follows: *Leverage* is the firm's leverage ratio, *Leverage*^{2} consists of the residuals of a regression of the square of *Leverage* on *Leverage*, $TrancheBperc.$ is the percentage of institutional term loan (Term B), *Analyst disagreement* is the deviation of the analysts' estimates from the true value of earnings per share, $Volatility$ indicates the volatility of equity, *Market-to-Book* is the market-to-book ratio, $Profitability$ indicates the profitability ratio defined as net income before extraordinary items over sales, $logTA$ is the logarithm of total assets. Appendix B provides a detailed description of the variables. Standard errors are clustered by industry and year. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Leverage	0.247***	0.261***	0.147***	0.305***	0.179***
	(0.036)	(0.046)	(0.042)	(0.051)	(0.045)
Leverage^2	-0.163***	-0.058	-0.049	-0.072	-0.053
	(0.035)	(0.045)	(0.039)	(0.048)	(0.041)
Tranche B perc.			0.302***		0.313***
			(0.019)		(0.020)
Analyst disagreement				-0.014***	-0.014***
				(0.005)	(0.003)
Volatility		-0.033	-0.110***	0.001	-0.103**
		(0.038)	(0.036)	(0.048)	(0.046)
Market-to-book		-0.024**	-0.008	-0.034***	-0.020**
		(0.009)	(0.009)	(0.010)	(0.009)
Profitability		0.065**	0.085***	0.069**	0.096***
		(0.031)	(0.027)	(0.035)	(0.030)
Log(Assets)		0.016***	0.024***	0.007	0.012*
		(0.006)	(0.006)	(0.007)	(0.007)
Constant	0.110***	0.035	-0.168***	0.107	-0.064
	(0.016)	(0.058)	(0.057)	(0.067)	(0.067)
Observations	3,346	2,738	2,738	2,438	2,438
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Table 4

Regressions of the probability of default

This table reports logit regressions of the probability of loan default, evaluated at the time of origination. The dependent variable is one if the firm subsequently defaulted on the loan while it was outstanding. Standard errors are clustered by issuer. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)
Cov-lite dummy	0.59**	0.28	0.66***	0.34
	(2.34)	(1.06)	(2.63)	(1.32)
Leverage		3.41***		3.30***
		(7.87)		(7.80)
Equity volatility			2.43***	2.14***
			(5.55)	(4.80)
Constant	-3.47***	-3.47***	-3.47***	-3.47***
	(-42.31)	(-42.31)	(-42.31)	(-42.31)
Observations	22,252	22,253	22,254	22,255

Table 5

Regressions of loan recovery rates

This tables reports OLS regressions of recovery rates at emergence from default reported in the URD. *Term loan* is an indicator variable that equals one for term loans and zero for revolving credit lines. *Second lien* and *Third lien and below* are dummy variables for the collateral rank, with the first lien serving as the omitted dummy. *Trading price* is a dummy variable if the recovery rate is estimated by Moody's based on the instrument's trading price post-emergence, and zero if it is estimated as the value of the settlement instruments at emergence. Standard errors are clustered by issuer. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Cov-lite dummy	-19.5***	-14.1***	-7.00	-4.75	0.56
	(-4.33)	(-3.12)	(-1.56)	(-1.05)	(0.12)
Term loan		-14.9***		-9.48***	-9.20***
		(-9.55)		(-6.40)	(-6.42)
Second lien			-28.3***	-25.2***	-24.6***
			(-7.92)	(-6.93)	(-6.76)
Third lien and below			-49.9***	-46.5***	-46.5***
			(-9.20)	(-8.45)	(-8.56)
Trading price					-27.0***
					(-5.10)
Constant	76.3***	83.8***	81.0***	85.3***	85.9***
	(55.16)	(63.65)	(57.28)	(64.44)	(67.96)
Observations	1,895	1,895	1,895	1,895	1,895
Adjusted R-squared	0.016	0.057	0.13	0.15	0.17

Table 6

Regressions of the loan-bond spreads on cov-lite status

The dependent variable in Columns (1) and (2) is the average return spread of the S&P / LSTA Leveraged Loan Index and the S&P 500 Investment Grade Corporate Bond Index. The dependent variable in Columns (3) and (4) is the average return spread of the Markit iBoxx USD Leveraged Loans Index and the S&P 500 Investment Grade Corporate Bond Index. The independent variable is the average fraction of cov-lite loans with respect to total number of loans issued in a given quarter. Panel A contains the results when data are averaged quarterly while Panel B displays the results when data are averaged at the monthly level. Appendix B provides a detailed description of the variables. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance levels, respectively.

Panel A: Quarterly Averages

	Avg Loan/Bond spread (S&P)		*Avg Loan/Bond spread (Markit)*	
	(1)	(2)	(3)	(4)
Avg Covlite	0.007	0.036	0.007	0.038
	(0.010)	(0.030)	(0.015)	(0.039)
Constant	-0.001	-0.005	-0.002	-0.007
	(0.002)	(0.004)	(0.004)	(0.008)
Year FE	No	Yes	No	Yes
N.Obs.	75	75	49	49

Panel B

Panel B: Monthly Averages

	Avg Loan/Bond spread (S&P)		*Avg Loan/Bond spread (Markit)*	
	(1)	(2)	(3)	(4)
Avg Covlite	0.008	0.023	0.007	0.021
	(0.008)	(0.017)	(0.011)	(0.020)
Constant	-0.001	-0.003	-0.002	-0.004
	(0.002)	(0.002)	(0.003)	(0.004)
Year FE	No	Yes	No	Yes
N.Obs.	222	222	144	144

Appendix A Model equilibrium and derivation

Following Goldstein, Ju, and Leland (2001), we model the process for the firm's EBIT as a Geometric Brownian Motion

$$\frac{dX_t}{X_t} = \mu dt + \sigma dB_t \tag{A1}$$

where μ is the growth rate and σ is the volatility. The risk-free rate is constant and equal to r and the tax rate is τ. As in Leland (1994) and Fischer, Heinkel, and Zechner (1989), the firm has tax benefits from issuing debt but also bankruptcy costs. In case of default, the firm loses a portion α of its value. The continuation value of the assets-in-place when the value of EBIT is X_t is equal to

$$V(X_t) = \mathbb{E}\left[\int_t^{\infty} (1-\tau) X_s e^{-rs} ds\right] = (1-\tau)\frac{X_t}{r-\mu} \tag{A2}$$

A.1 No Covenant and Complete Information

If there are no covenants, the value of debt as a function of firm's EBIT and coupon is equal to

$$\mathbf{D}^U(X_t, C) = \underbrace{(1-\mathbf{p}(X_t, X_B))\frac{C}{r}}_{\substack{\text{NPV of coupons}\\ \text{until default}}} + \underbrace{\mathbf{p}(X_t, X_B)(1-\alpha)V(X_B)}_{\text{NPV of debt value at default}} \tag{A3}$$

where C is the coupon paid on the outstanding debt, X_B is the default threshold, $\mathbf{p}(X_t, X_B)$ is the value of a claim that pays one dollar upon default. Note that we use the superscript U to differentiate the value of unprotected debt from the value of debt in the presence of covenants.

Proof. Let T_B denote the stopping time at which the firm defaults. The value of unprotected debt is equal to

$$\begin{aligned}\mathbf{D}^U(X_t, C) &= \mathbb{E}\left[\int_t^{T_B} Ce^{-rs} ds + (1-\alpha)V(X_t)e^{-rT_B}\right]\\ &= \left(1-\mathbb{E}(e^{-rT_B})\right)\frac{C}{r} + (1-\alpha)V(X_t)\mathbb{E}(e^{-rT_B})\end{aligned}$$

The calculation of $\mathbb{E}(e^{-rT_B})$ is a simple stopping time problem which is known to have solution

$$\mathbb{E}(e^{-rT_B}) = (X_t/X_B)^{-\beta_2} \tag{A4}$$

where β_2 is the positive root of $0.5\sigma^2 y^2 + (\mu - 0.5\sigma^2)y - r = 0$ as shown in Stokey (2009). Substituting Equation (A4) into the expression for $\mathbf{D}^U(\cdot)$ above concludes the proof of Equation (A3). □

The value of equity is

$$\mathbf{E}^U(X_t, C) = \underbrace{(1-\tau)\left[\left(\frac{X_t}{r-\mu} - \frac{C}{r}\right) - \mathbf{p}(X_t, X_B)\left(\frac{X_B}{r-\mu} - \frac{C}{r}\right)\right]}_{\text{NPV of cash flows to equity until default}} \tag{A5}$$

Proof. The value of equity can be calculated as follows:

$$\begin{aligned}\mathbf{E}^U(X_t, C) &= \mathbb{E}\left[\int_t^{T_B}(1-\tau)(X_s - C)e^{-rs}ds\right]\\ &= (1-\tau)\left[\left(\frac{X_t}{r-\mu} - \frac{C}{r}\right) - \mathbb{E}(e^{-rT_B})\left(\frac{X_B}{r-\mu} - \frac{C}{r}\right)\right]\end{aligned}$$

Substituting the result in Equation (A4) into the above equation concludes the proof of Equation (A5). □

The value of the firm is the sum of equity and debt values

$$\mathbf{v}^U(X_t, C) = \mathbf{E}^U(X_t, C) + \mathbf{D}^U(X_t, C) \tag{A6}$$

As in Leland (1994), shareholders set the optimal default threshold as to maximize the value of equity with respect to limited liability. Formally, X_B is obtained using the smooth-pasting condition $\frac{\partial \mathbf{E}^U}{\partial X}\Big|_{X=X_B} = 0$ which yields

$$X_B^U = \frac{\beta_2}{1+\beta_2}\frac{r-\mu}{r}C \tag{A7}$$

A.2 Covenant with complete information

We assume that there is a covenant threshold X_C such that if the level of current EBIT X_t drops below this threshold, it triggers technical default. The face value of debt is FV. If the covenant is set to $X_C < X_B$, the covenant would never be triggered and the values of debt and equity are as in the model with no covenants provided in Appendix A.1.

Let $T_C : \{t > 0 : X_t \leq X_C\}$ denote the stopping time at which the firm violates a covenant. When there is a covenant violation that is resolved with renegotiation, debtholders receive a lump-sum payment from shareholders in exchange for not enforcing the covenant (i.e. not forcing the firm into default). It follows that, after a covenant violation, the values of debt and equity are the same as in the case of unprotected debt (Appendix A.1).

When the covenant has not been triggered yet ($t < T_C$), the value of debt is

$$\mathbf{D}^P(X_t, X_C, C) = \underbrace{(1 - \mathbf{p}(X_t, X_C))\frac{C}{r}}_{\substack{\text{NPV of coupons}\\ \text{until covenant violation}}} + \underbrace{\mathbf{p}(X_t, X_C)DXC}_{\substack{\text{NPV of debt at}\\ \text{covenant violation}}} \tag{A8}$$

where DXC is the value of debt at X_C is

$$DXC = \begin{cases} FV & \text{if repayment}\\ \min\left[FV, (1-\alpha)V(X_C)\right] & \text{if liquidation}\\ D^U(X_C, C) + \eta(\alpha-\kappa)V(X_C) & \text{if renegotiation}\end{cases} \tag{A9}$$

where $D^U(X_C, C)$ is provided in Equation (A3), and FV is the face value of debt. Equation (A9) implies that debtholders receive the face value of debt upon repayment, they receive either the recovery value $(1-\alpha)V(X_C)$ or the face value upon liquidation (whichever is smallest), and they get a lump-sum payment equal to $\eta(\alpha-\kappa)V(X_C)$ upon renegotiation in exchange for not enforcing the covenant.

Proof. The value of debt prior to a covenant violation is

$$\begin{aligned}\mathbf{D}^P(X_t, X_C, C) &= \mathbb{E}\left[\int_t^{T_C} Ce^{-rs}ds + DXCe^{-rT_C}\right] \\ &= \frac{C}{r}\left(1 - \mathbb{E}(e^{-rT_C})\right) + \mathbb{E}(e^{-rT_C})DXC\end{aligned}$$

$\mathbb{E}(e^{-rT_C})$ is the same stopping time problem as in Equation (A4) with the exception that the stopping threshold is at X_C rather than X_B, therefore we can use the solution in Equation (A4). Substituting the solution of $\mathbb{E}(e^{-rT_C})$ into the above equation concludes the proof of Equation (A8). □

The value of equity before the covenant is triggered (i.e. for $t < T_C$) is equal to

$$\mathbf{E}^P(X_t, X_C, C) = \underbrace{(1-\tau)\left[\left(\frac{X_t}{r-\mu} - \frac{C}{r}\right) - \mathbf{p}(X_t, X_C)\left(\frac{X_C}{r-\mu} - \frac{C}{r}\right)\right]}_{\text{NPV of cash flows to equity until covenant violation}} + \underbrace{\mathbf{p}(X_t, X_C)EXC}_{\substack{\text{NPV of equity when} \\ \text{covenant is violated}}} \tag{A10}$$

where EXC is the value of equity at the time the covenant is triggered and is equal to

$$EXC = \begin{cases} V(X_C) - (1+f)FV & \text{if repayment} \\ \max\left[0, (1-\alpha)V(X_C) - FV\right] & \text{if liquidation} \\ \mathbf{E}^U(X_C, C) - \eta(\alpha-\kappa)V(X_C) - \kappa V(X_C) & \text{if renegotiation} \end{cases} \tag{A11}$$

where $\mathbf{E}^U(X_C, C)$ is the value of equity when the debt is unprotected, and is provided in Equation (A5), $\eta(\alpha - \kappa)V(X_C)$ is the lump-sum payment that shareholders make to debtholders, and $\kappa V(X_C)$ is the total of renegotiation costs. The value of equity after covenant violation is the same as the equity value when debt is unprotected, which is provided in Equation (A5).

Proof. The value of equity prior to a covenant violation is

$$\begin{aligned}\mathbf{E}^P(X_t, X_C, C) &= \mathbb{E}\left[\int_t^{T_C} (1-\tau)(X_s - C)e^{-rs}ds + EXCe^{-rT_C}\right] \\ &= (1-\tau)\left[\left(\frac{X_t}{r-\mu} - \frac{C}{r}\right) - \mathbb{E}(e^{-rT_C})\left(\frac{X_B}{r-\mu} - \frac{C}{r}\right)\right] + \mathbb{E}(e^{-rT_C})EXC\end{aligned}$$

Substituting the solution of $\mathbb{E}(e^{-rT_C})$ into the above equation concludes the proof of Equation (A10). □

A.3 Asymmetric Information

The value of unprotected debt under asymmetric information is equal to

$$\mathbf{D}^U_{asym}(X_t, C) = \int_t^{\infty} \mathbf{D}^U(x, C)g(x|X_0)dx \tag{A12}$$

where $g(\cdot|X_0)$ is the density of the log-normal distribution with mean 0 and volatility γ. This assumption implies that debtholders expect the true value X_t at time t to be equal to the last observed true EBIT value X_0. $\mathbf{D}^U(x, C)$ is given in Equation (A3). Since insiders know the true value of EBIT X_t, the value of equity when the debt is unprotected, $\mathbf{E}^U(X_t, C)$, is the same as in Equation (A5) the complete information case. The value of the firm is

$$\mathbf{v}^U_{asym}(X_t, X_0, C) = \mathbf{E}^U(X_t, C) + \mathbf{D}^U_{asym}(X_0, C) \tag{A13}$$

The value of protected debt under asymmetric information is equal to

$$\mathbf{D}^P_{asym}(X_0, X_C, C) = \int_t^\infty \mathbf{D}^P(x, X_C, C) g(x|X_0) dx \tag{A14}$$

where $\mathbf{D}^P(x, X_C, C)$ is provided in Equation (A8). Since shareholders know the true value of EBIT, the value of equity when the debt is protected, $\mathbf{E}^P(X_t, X_C, C)$, is the same as in Equation (A10). The value of the firm is

$$\mathbf{v}^P(X_t, X_0, X_C, C) = \mathbf{E}^P(X_t, X_C, C) + \mathbf{D}^P(X_0, X_C, C) \tag{A15}$$

A.4 Optimal Policies

For a given covenant threshold X_C, shareholders choose the optimal default policy according to the smooth-pasting condition:

$$X^P_B(X_C, C) = \left\{ X_B : \left. \frac{\partial \mathbf{E}^P(X_t, X_C, C)}{\partial X} \right|_{X = X_B} = 0 \right\} \tag{A16}$$

We assume that capital structure is exogenous and the firm needs to raise debt. Debt is issued at par and the amount of debt to be issued is FV. Shareholders choose the optimal covenant threshold, X^*_C, to maximize the firm value at the time of issuance subject to the constraints that (i) the firm needs to raise an amount FV and (ii) the optimality conditions for X_B described in Equation (A16). More formally,

$$\begin{aligned}
& X^*_C = \arg\max_{X_C} \mathbf{v}^P(X_t, X_0, X_C, C) \\
& \text{subject to} \\
& \mathbf{D}^P(X_0, X_C, C, t) = FV \\
& \left. \frac{\partial \mathbf{E}^P(X_t, X_C, C)}{\partial X} \right|_{X = X_B} = 0.
\end{aligned}$$

Closed-form solutions for the optimality conditions described here could not be obtained and we use standard numerical procedures.

Appendix B Variable Definitions

This section reports a detailed description of the variables divided by database. We drop observations with missing values of covenant strictness and leverage and we winsorize all variables to the 1 and 99 percentiles to avoid the influence of outliers.

Compustat

$EBITDA$ = Sum of rolling four-quarter operating income before depreciation (*oibdpq*)

Industry = industry in which the firm operates is calculate as the two digit sic code (*sich*)

TA = firm's total assets (*atq*)

$logTA$ = logarithm of Total Assets = $\log(TA)$

Leverage = leverage ratio. We calculate the leverage ratio as long term debt plus debt in current liabilities divided by total assets = $\frac{dlttq+dlcq}{atq}$

$Leverage^2$ = the residuals of a regression of squared leverage on leverage.

$Volatility$ = Volatility of Equity. We calculate the volatility of daily stock returns (from CRSP) and annualize it by a factor of $\sqrt{252}$.

$Market-to-book$ = market to book ratio calculated as $(TA + MKTCAP - BVE)/TA$, wehre TA is the firm's total assets, $MKTCAP$ is the firm's market capitalization and BVE is the book value of equity.

$Profitability$ = the ratio of net income before extraordinary items (*ibq*) divided by sales (*saleq*).

Dealscan

cov_lite = indicator variable which is equal to 1 for loans that are classified as being cov-lite

Strictness = measure of covenant strictness calculated according to the methodology in Murfin (2012)

Loan_Size = The total amount of the loan package (*DealAmount*)

Num. Lenders = Number of lenders in the syndicate.

Tranche B Perc. = Percentage of non-bank institutional term loan (Term B) as a fraction of the total loan value = $\frac{\text{Term B amount}}{\text{Term A amount + Term B amount}}$

IBES

analyst_mean = mean analysts' estimate *meanest*

actual = actual value disclosed by the firm for the same period as the analysts' estimate.

Analyst disagreement = the deviation of the analysts' from the actual value = $analyst\_mean - actual)/analyst\_mean)$

Loan and Bond Indices

loan (S&P) index = S&P / LSTA Leveraged Loan Total Return Index.

loan (Markit) index = Markit iBoxx USD Leveraged Loans Total Return Index.

bond index = S&P 500 Investment Grade Corporate Bond Total Return Index.