The Defeasance of Control Rights

C. Bienz,[1,4]

A. Faure-Grimaud,[2,4]

and

Z. Fluck[3,4]

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ABSTRACT

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We analyze one frequently used clause in public bonds called "covenant defeasance". Defeasance allows the bond issuer to remove all of the bond's covenants by placing the remaining outstanding payments with a trustee in an escrow account. Bond covenants are predominantly negative (non-contingent) covenants. By giving the firm an option to remove covenants, non-contingent control rights can be made state-contingent even when no interim signals are available. Apart from providing a theoretical justification for defeasance we show empirically that defeasance allows for the inclusion of more covenants in bond issues. Also, investors are willing to pay a premium of 20 to 88 basis points for defeasable bonds.

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[1]Norwegian School of Economics and Business Administration (NHH), Centre for Financial Studies (CFS), and Financial Markets Group at the London School of Economics (LSE), carsten.bienz@nhh.no

[2]Department of Finance and Financial Markets Group at the LSE, a.faure-grimaud@lse.ac.uk

[3]Michigan State University (MSU), fluck@bus.mus.edu

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1 Introduction

Jensen and Meckling (1976) argue that an incentive conflict can arise between equity and debt holders, increasing the firm's cost of debt. Smith and Warner (1978) argue that one way to overcome this problem is to restrict the firm's actions via the inclusion of debt covenants. The commitment value of these covenants comes at the cost of reduced flexibility for the firm. This may force the firm to forgo value-increasing investment projects (Chava and Roberts (2008)) unless these covenants are waived or removed. In contrast to privately held loans, removing or renegotiating public bond covenants is extremely difficult (Roberts and Sufi (2008) and Bradley and Roberts (2004)). One reason for this is the Trust Indenture Act (TIA) of 1939 that requires the consent of the holders of two thirds of the principal amount of outstanding debt to modify a covenant (Smith and Warner (1978)). Indeed, Bradley and Roberts (2004) state "public debt issues contain covenants that are virtually impossible to negotiate and especially to renegotiate." This view is shared by Bolton and Jeanne (2007) and Brunner and Krahnen (2008) who show that debt renegotiation is more complex when lenders are more numerous.

In this paper we show that one solution to this problem is to give the bond issuer the option (covenant defeasance) to remove the covenants at the issuer's discretion. The option's strike price ensures that covenants are only removed when it is efficient to do so. We provide both a theoretical model to analyze this defeasance option and empirical evidence that these options are included in more than 60% of all US corporate bond issues. We show that investors are willing to pay a premium of 22 to 88 basis points for defeasance.

Ideally, debt covenants should allow the firm to pursue all value-increasing investments while ensuring that the firm does not take actions that are detrimental to bondholders. However, it is often not easy to discriminate between these two actions. Imagine a firm that wants to pay out dividends because it has no value increasing investment opportunities. A control right that forbids all dividend payments (and thus protects the lender from a firm that pays out more than it should) would also prohibit such a payment. The firm cannot afford to ignore such a covenant as a violation would be interpreted as a default. Hence, covenants are often made contingent on signals about the firm's state, i.e. the firm having performed poorly. One example for such a covenant is a clause that would require the firm to maintain a certain net wealth. However, there are situations when such a contingency is impossible to implement as a meaningful signal is not available. Then the firm may have no choice but to give unconditional covenants to their lenders. An example is the aforementioned restriction on dividends. Using such covenants however leads to the problem raised above, namely that the firm may be forced to forgo value-increasing investment projects.

In this paper we study one mechanism that may help the firm reduce the problems caused by non-contingent covenants. The basic idea for our model is as follows: to reduce its cost of capital, a firm might give control rights to a financier. The firm ideally would like to give away state-contingent control rights but we assume that there is no interim signal available that would be a sufficient statistic for the firm's state. Hence the firm can only give away unconditional control rights. If a firm wants to remove some of these control rights to implement a value increasing investment, the "owners" of this control right will be able to capture some or all of the surplus associated with the removal of this control right, as they can hold-up the firm. This may deter the firm from implementing such an investment. However, if the firm is given an appropriately structured option to remove the control rights this hold-up problem can be overcome. By giving the firm an option to remove covenants, non-contingent control rights can be made state-contingent even when no interim signals are available. We show that i) this option has to be costly ex-ante in order to ensure that it is only exercised in those states of nature when it is efficient; ii) such an option allows for the firm to give away more control rights; iii) it is optimal to remove several or all control rights simultaneously and iv) that some firms will not use this option.

Next we examine the empirical evidence for such an option. We use the Fixed Income Securities Database (FISD) to look at all US corporate bonds issues over 1989 - 2006. More than 90% of all issues contain at least one covenant. Almost all bond covenants that we observe are "hard" covenants in the sense that they are normally non-contingent covenants that restrict asset sales or additional debt issuance rather than covenants based on financial ratios. We find that more than 60% of all US corporate bonds include option style provisions that closely resemble those analyzed in our model. These options (called covenant defeasance clauses) allow the bond issuer to remove all covenants at once, as predicted by our model. The price to be paid for defeasance is a sum of cash or US government securities equal to the remaining outstanding coupon and principal. This amount has to be placed in an escrow account with a trustee, essentially making the issue risk-free. This finding is consistent with our model that suggests that this option needs to be costly as otherwise it will be exercised in the bad state of nature. We also find, in line with the model, that some firms don't hold these options. Additionally, we find that issues that have a defeasance option included have more covenants attached, in line with our model. When we examine the impact of defeasance on bond yields we find that the inclusion of defeasance leads to a 22 to 88 basis points reduction of yields. We include several robustness checks to test whether underwriters include defeasance in a boiler-plate fashion and find that this is not the case. Finally we find that some 65% of all issues that include a defeasance provision are also callable. As a borrower's ability to call the issue without restrictions could act as a perfect substitute for defeasance we examine the conditions under which these issues are callable. We find that either issues have to be called at a premium over par or have an initial quiet period and thus are not perfect substitutes for defeasance. Hence the ability to call a bond in the context of our sample should be considered as a call option on interest rates, not on covenants. This allows us to suggest that defeasance is a viable mechanism to reduce the hold-up risk caused by non-contingent covenants.

2 Literature

A potential conflict of interest between shareholders and bondholders is the main reason for the relevance of bond covenants (Jensen and Meckling (1976)). Smith and Warner (1978) discuss how particular covenants can be used to overcome this conflict of interest. A multitude of papers show that covenants are indeed use to overcome the shareholder bondholder conflict, one recent example being Bradley and Roberts (2004). A more general formal analysis of how contingent control rights can increase a firm's pledgeable income and potentially solve a conflict between shareholders and bondholders is due to Aghion and Bolton (1992). Our contribution is to show that firms that use defeasance are comfortable with the inclusion of more covenants relative to firms that do not use defeasance.

The fact that (bond) covenants influence a firm's strategy is well documented by Chava and Roberts (2008) and Billet, King, and Mauer (2007). Chava and Roberts (2008) show how capital investment decreases sharply following a financial covenant violation, in particular in situations with more severe agency problems.

Fudenberg and Tirole (1990) and Hermalin and Katz (1991) model the impact of renegotiation on outcomes. Aghion and Rey (1994) show how renegotiation design can influence the efficiency of outcome. Garleanu and Zwiebel (2008) explicitly model bond covenants and show that under asymmetric information more covenants are allocated to bondholders than under symmetric information. The costs of technical violations of covenants can be quite substantial for firms and can be between 0.84 to 1.63% of a firm's market value according to Beneish and Press (1993). These costs are a lower bound as technical violations are followed by an inclusion of more restrictive covenants. Roberts and Sufi (2008) show that bank loans are frequently renegotiated and emphasize the fact that covenants can determine parties' outside options during renegotiation. Our contribution is to show how some features of public bonds can be efficiently removed in face of a free rider problem due to a large number of investors.

The commitment value of public bonds relative to bank loans has been documented extensively in the corporate and emerging markets literature: Brunner and Krahnen (2008) and Bolton and Jeanne (2007) respectively show that debt restructuring becomes more difficult the more lenders are involved. The results documented by Roberts and Sufi (2008) that a large fraction of all loan contracts are renegotiated prior to maturity can therefore not easily be transferred to public bonds. We indicate a different method of solving this issue: giving the issuer the option to remove the covenants in exchange for making the bond risk-less.

Our model also contributes to the literature on multiple control rights and on the discussion of option contracts in overcoming hold-up problems. Nöldeke and Schmidt (1995) show how option contracts can overcome hold-up problems with respect to contractual incompleteness. We show how option contracts can not only be used to overcome hold-up but can also be used to ensure that control are de-facto state contingent even if there is no observable signal available that would allow for giving the principal state-contingent rights. Aghion and Tirole (1997) show how multiple control rights should be allocated between an agent and a principal. We expand on their model and show how the number of control rights assigned to the principal can be made endogenous.

3 A Model of Multiple Control Rights.

In what follows we will present a simple model of multiple control rights. The idea behind our model is to ask how to assign control rights in the absence of a verifiable intermediate signal in the sense of Aghion and Bolton (1992). Our model comes straight from Tirole (2006), (itself based on Holmström and Tirole (1997)) and can be seen as an extension of Aghion and Bolton (1992) and Aghion and Tirole (1997).

3.1 Players and Technology.

There is a firm who has an investment project. The firm can invest initially a fixed amount I and if so generates a return Y of either $Y = 0$ in case of failure or some amount $Y = R$. The firm only possess some amount $A \leq I$ and needs a financier to finance $I - A$. Once investment has taken place, the firm has to decide upon an effort level $e \in \{0, 1\}$. Exerting no effort ($e = 0$) gives him some private benefit B. After effort has been selected, but before final returns are realized, a signal $s \in \{L, H\}$ is observed which is indicative of the final chances of success. This interim signal is also taken to be a sufficient statistics for the firm's effort. After the observation of the signal, it is possible to choose to implement 1 to K decisions. Regardless of the signal's realization, implementing decision k results in an increase in the final probability of success τ_k, while the firm suffers from a "private" disutility γ_k. For convenience we rank those decisions by their benefit-to-cost ratio, $\frac{\tau_k R}{\gamma_k}$ with the convention that decision 1 has the highest such ratio. Implementing a decision is efficient if and only if $\frac{\tau_k R}{\gamma_k} \geq 1$. We denote by k^* the last (first best) efficient decision (i.e. so that $\frac{\tau_k R}{\gamma_k} \geq 1$ while $\frac{\tau_{k+1} R}{\gamma_{k+1}} < 1$). We denote by d_k the probability of implementing decision k.

The ex ante chances of success are formally dependent on effort, interim states and decisions as follows:

$$\begin{aligned} Prob(s|e = e_H) &= \sigma_{Hs} \\ Prob(s|e = e_L) &= \sigma_{Ls} \\ Prob(Y = R|s) &= \nu_s + \sum_{k=1}^{K} d_k \tau_k \end{aligned}$$

The effort is not observable nor verifiable. Final returns are verifiable. The interim state of the world $s = \{L, H\}$ is not verifiable, although it is observable by both parties.

We assume that the project NPV is negative if $e = 0$ and also that:

A1: $A < I - \left(\sigma_{HH}\nu_H + (1 - \sigma_{HH})\nu_L + \sum_{k=1}^{k^*} \tau_k d_k\right)\left(R - \frac{B}{\Delta\sigma\Delta\nu}\right)$.

This assumption ensures that the ex-ante expected pledegable income is not sufficient to compensate the investor if he is only allowed all efficient decisions.

3.2 Control Allocation without Defeasance.

We suppose here that the contract can only specify a final repayment from the firm to the financier and that each decision k is to be implemented with probability d_k (and is not contingent on the interim signal). We rule out for the moment the possibility of interim renegotiation. Under the choice of high effort, the firm's payoff is:

$$
\begin{aligned}
\max_{R_b, d_k} \quad & \sigma_{HH}\left(\left(\nu_H + \sum_{k=1}^{K} \tau_k d_k\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k\right) + \\
& (1-\sigma_{HH})\left(\left(\nu_L + \sum_{k=1}^{K} \tau_k d_k\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k\right)
\end{aligned}
$$

and the incentive constraint requires that:

$$
\begin{aligned}
& \sigma_{HH}\left(\left(\nu_H + \sum_{k=1}^{K} \tau_k d_k\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k\right) + \\
& (1-\sigma_{HH})\left(\left(\nu_L + \sum_{k=1}^{K} \tau_k d_k\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k\right) \geq
\end{aligned}
$$

$$
\begin{aligned}
& \sigma_{LH}\left(\left(\nu_H + \sum_{k=1}^{K} \tau_k d_k\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k\right) + \\
& (1-\sigma_{LH})\left(\left(\nu_L + \sum_{k=1}^{K} \tau_k d_k\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k\right) + B
\end{aligned}
$$

which simplifies to

$$
(R - R_b) \geq \frac{B}{\Delta\sigma\Delta\nu}. \tag{IC}
$$

The financier accepts the contract if and only if:

$$
\sigma_{HH}\left(\nu_H + \sum_{k=1}^{K} \tau_k d_k\right) R_b + (1-\sigma_{HH})\left(\nu_L + \sum_{k=1}^{K} \tau_k d_k\right) R_b \geq I - A \tag{IR}
$$

The optimal contractual arrangement is the one that maximizes the firm's payoff subject to (IC) and (IR). Forming the Lagrange function (where α, resp. λ, is the multiplier of the (IC), resp. (IR), constraint) and taking its partial derivatives, we have:

$$
\begin{aligned}
\frac{\partial L}{\partial R_b} &= (\lambda - 1)\left(\sigma_{HH}\nu_H + (1-\sigma_{HH})\nu_L + \sum_{k=1}^{K} \tau_k d_k\right) - \alpha \\
\frac{\partial L}{\partial d_k} &= \tau_k R - \gamma_k + (\lambda - 1)\tau_k R_b
\end{aligned}
$$

It cannot be that $\alpha = 0$, otherwise $\lambda = 1$ and $R_b = R - \frac{B}{\Delta\sigma\Delta\nu}$ and only the first-best efficient decisions are implemented with probability 1. But if this is the case, the financier can at best get:

$$
\left(\sigma_{HH}\nu_H + (1-\sigma_{HH})\,\nu_L + \sum_{k=1}^{k^*} \tau_k d_k\right)\left(R - \frac{B}{\Delta\sigma\Delta\nu}\right) < I - A
$$

as implied by **A1.**

If $\alpha > 0$, then $\lambda > 1$ and a decision is implemented if and only if:

$$\frac{\tau_k R}{\gamma_k} \geq 1 - (\lambda - 1)\frac{\tau_k R_b}{\gamma_k}$$

and this indicates that some inefficient decision (i.e. those for which $1 > \frac{\tau_k R}{\gamma_k} \geq 1-(\lambda-1)\frac{\tau_k R_b}{\gamma_k}$) will also be taken. A particular mechanism to implement this outcome is to give to the financier the control over the decisions $k = 1, ...\widetilde{k}$ (with $\widetilde{k}$ being the last decision so that $\frac{\tau_{\widetilde{k}} R}{\gamma_{\widetilde{k}}} \geq 1 - (\lambda - 1)\frac{\tau_{\widetilde{k}} R_b}{\gamma_{\widetilde{k}}}$) while the firm keeps control over the other decisions. Provided no renegotiation takes place, the financier will always choose to implement any decision he can, while the firm will not. The argument so far follows Tirole's (2006) analysis and we record this as a result:

Result 1: if the interim state of the world is non verifiable, and in the absence of renegotiation, allocating control over decisions 1 to $\widetilde{k}$ to the financier, and the firm controlling the other decisions is optimal. Moreover $\widetilde{k} \geq k^*$.

The last inequality is strict when the differences between $\frac{\tau_k R}{\gamma_k}$ and $\frac{\tau_{k+1} R}{\gamma_{k+1}}$ are small enough.

Thus, if the interim state of the world is non verifiable the financier gets more control rights than the first-best solution would suggest. This introduces an inefficiency in the sense that the firm/manager loses some private benefits.

3.3 Control Allocation with Defeasance.

It is important to notice that allocating the *same* rights to the financier in the H state and in the L state is *not* desirable, although those decisions have identical consequences in both states. This is best seen by introducing the possibility that the control rights of the financier could differ across states (while still ruling out debt repayment contingent on this signal). Denote by d_k^σ the probability to implement decision k in state σ. In that case, the new programme is:

$$\max_{R_b, d_k^H, d_k^L} \quad \sigma_{HH}\left(\left(\nu_H + \sum_{k=1}^{K} \tau_k d_k^H\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k^H\right) + (1 - \sigma_{HH})\left(\left(\nu_L + \sum_{k=1}^{K} \tau_k d_k^L\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k^L\right)$$

and the incentive constraint requires that:

$$\sigma_{HH}\left(\left(\nu_H + \sum_{k=1}^{K} \tau_k d_k^H\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k^H\right) + (1 - \sigma_{HH})\left(\left(\nu_L + \sum_{k=1}^{K} \tau_k d_k^L\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k^L\right) \geq$$

$$\sigma_{LH}\left(\left(\nu_H+\sum_{k=1}^{K}\tau_k d_k^H\right)(R-R_b)-\sum_{k=1}^{K}\gamma_k d_k^H\right)+$$
$$(1-\sigma_{LH})\left(\left(\nu_L+\sum_{k=1}^{K}\tau_k d_k^L\right)(R-R_b)-\sum_{k=1}^{K}\gamma_k d_k^L\right)+B$$

which simplifies to

$$\Delta\sigma\left(\Delta\nu\,(R-R_b)+\sum_{k=1}^{K}\tau_k\left(d_k^H-d_k^L\right)(R-R_b)-\sum_{k=1}^{K}\gamma_k\left(d_k^H-d_k^L\right)\right)\geq B.$$

The financier's IR constraint can be similarly amended. It is straightforward to check that the partial derivatives of the Lagrange function now become:

$$\begin{aligned}
\frac{\partial L}{\partial R_b} &= (\alpha-1)\left(\sigma_{HH}\left(\nu_H+\sum_{k=1}^{K}\tau_k d_k^H\right)+(1-\sigma_{HH})\left(\nu_L+\sum_{k=1}^{K}\tau_k d_k^L\right)\right)- \\
&\quad \lambda\left(\Delta\sigma\Delta\nu+\Delta\sigma\sum_{k=1}^{K}\tau_k(d_k^H-d_k^L)\right) \\
\frac{\partial L}{\partial d_k^H} &= \tau_k R-\gamma_k+(\alpha-1)\tau_k R_b+\lambda\frac{\Delta\sigma}{\sigma_{HH}}\left(\tau_k\left(R-R_b\right)-\gamma_k\right) \\
\frac{\partial L}{\partial d_k^L} &= \tau_k R-\gamma_k+(\alpha-1)\tau_k R_b-\lambda\frac{\Delta\sigma}{1-\sigma_{HH}}\left(\tau_k\left(R-R_b\right)-\gamma_k\right)
\end{aligned}$$

Lemma 1: It must be that $d_k^{H^*}\leq d_k^*$ Or equivalently, $k_H^*\leq k^*\leq\widetilde{k}$.

Proof: see Appendix

This result simply states that if control rights could be made contingent over states, the financier would receive not all efficient control rights. The reason for this seeming inefficiency is because the firm does not reap all financial benefits from implementing decisions $k_H^*-k^*$ but has to bear all the costs. Thus, seen from the firm's point of view it is only efficient to give away k_H^* decisions.[1]

Again, those inequalities will be strict if the differences between $\tau_k R-\gamma_k$ and $\tau_{k+1}R-\gamma_{k+1}$ are sufficiently small.

Lemma 2: It must be that for all $k=1...k_L^*$, $d_k^{L^*}=1$. Moreover, $k_L^*\geq k^*$.

Proof: see Appendix

Notice that the previous two lemmata imply that $k_L^*\geq k_H^*$.

[1]Note that this also means that there is no point in trying to renegotiate this, as the financier will not be able to compensate the firm for its loss of private benefits.

This result states that the firm has to give away more control rights in the bad state of nature that in the good state or under the first-best. Thus, with **Lemma 1** & **Lemma 2** we have established that in the good state of nature, the financier should hold fewer than the first best amount of control rights k^*, but he should hold more control rights in the bad state of nature. In other words, if it were possible to make control rights state contingent, the financier should have **more** control in the bad state of nature.

We refer to $\{k^*_H, k^*_L\}$ as the constrained-efficient decision rule in the sequel. It is the decision rule that would be efficient to implement, contingent on the realization of σ, when at the same time the final repayment R_b can only depend on the realization of the final returns Y.

Proposition 1: if the interim state is non verifiable, the following mechanism can implement the constrained-efficient decision rule:

- give control to the financier over k^*_L decisions.
- give an option to the firm to buy back control over decisions k^*_H to k^*_L. The cost of exercising this option must be chosen so that the firm can only exercise this option if $\sigma = H$.
- if $k^*_H = 0$, the firm must have the option to buy back control over *all* decisions

Proof: the proof follows from the fact that $k^*_H < k^*_L$. Notice that a sufficient condition for $k^*_H = 0$ is that $\tau_k R - \gamma_k \leq 0$ for all k, i.e. that implementing any decision is inefficient.

What should be the price of this option? Suppose first that the firm has no cash, so that it is paid by an increase in the financier's share of returns (i.e. an increase in R_b). Call r_b this increase.

The first thing to observe is that the value of buying back control over any decision is independent of whether $\sigma = H$ or L. Indeed the firm's value of removing any decision k is simply $\tau_k(R - R_b) - \gamma_k$. What is affected by the interim state of nature though is his ability to exercise the option. Suppose he needs to pay some amount P to exercise the option. If the firm has no cash of his own, he can raise up to $(\nu_H + \sum_{k=1}^{K} \tau_k d^H_k) r_b$ in state H when buying back control over decisions k^*_L to k^*_H. If the firm was to exercise the option in state L, he would be able to raise $(\nu_L + \sum_{k=1}^{K} \tau_k d^H_k) r_b$, a lesser amount. Notice that because this option can only be exercised at date 1, that is after the effort choice has been irrevocably made, the firm can tap into a "fresh" new debt capacity. We can then conclude:

Proposition 2: An option to buy back control over *all* decisions k^*_H to k^*_L at a price P so that:

$$(\nu_L + \sum_{k=1}^{K} \tau_k d^H_k)(R - R_b) \leq P \leq (\nu_H + \sum_{k=1}^{K} \tau_k d^H_k)(R - R_b)$$

can implement the constrained-efficient decision rule.[2] Importantly, the option must only allow for a buyback of control rights over *all* decisions k_H^* to k_L^*. No "unbundling" of this option should be allowed as otherwise if the firm was allowed to buy back control over some *individual* decisions at lower prices, he would be able to do so in the L even with his lower ability to raise more funds.

Proposition 2.1: It is in the lender's best interest to price the defeasance of any individual covenant in such a way that the borrower can only afford to defease this covenant in the high state. (To be shown formally) This implies that the price of a defeascing several individual covenants will be higher than the price of a portfolio of covenants

It is not clear however that giving more control rights to the financier, together with the option for the firm to remove some, is always a better arrangement than giving fewer control rights to the financier with no option. To see why this is not obvious, compare the firm's situation after the realization of each interim state under both mechanisms. As far as the provision of incentives is concerned, it is best that the firm is punished as harshly as possible in the L state and is rewarded as generously as possible in the H state. The exercise price of the option has no impact on the firm's payoff when the option is not exercised, that is in state L. So the only consideration as far as the determination of the optimal price is concerned is what happens in the H state. This discussion already indicates that the best option mechanism must have an exercise price as below:

Lemma 3: $P^* = (\nu_L + \sum_{k=1}^{K} \tau_k d_k^H)(R - R_b)$

This is indeed the best way to reward the firm after a H state. The price cannot be less than this amount, otherwise the option will be exercised all the time. But the need to maximize the firm's reward implies that it should not be more either. So this price works as a cap on the firm's payments, but he can only afford to pay this cap in the good state.

How does the option compare with the first mechanism i.e. the one that gives $\widetilde{k}$ irrevocable control rights to the financier? First, we show:

Proposition 3: When the firm is given the option to buy back control over decisions k_H^* to k_L^*, the financier has control ex ante over a larger number of decisions than in absence of this option: $k_L^* \geq \widetilde{k}$.

Proof: suppose this is not true, i.e. $k_L^* < \widetilde{k}$. As $k_H^* \leq k^* \leq \widetilde{k}$, then when the option is offered, in both states of the world the financier has control over fewer decisions than $\widetilde{k}$. This contradict the fact that $\widetilde{k}$ is the optimal number of decisions over which the financier should have control.

The last proposition implies that in state L, the firm is more harshly punished with the option mechanism. This option is then not exercised and more decisions are implemented.

[2] Under the standard assumption that indifference are broken in favor of efficiency. If not, the inequalities should be strict.

Therefore, the main empirical implication of Proposition 3 is that when one compares the control rights formally offered to the financier in presence of this option (k_L^*) with the rights he has when the option is not offered ($\widetilde{k}$), one finds a positive association between the number of rights given to the financier and the existence of the option (i.e. $k_L^* \geq \widetilde{k}$).

Identifying which mechanism provides the best incentives overall needs considering which one allows for a larger reward in a H state. This is not trivial. With the option mechanism, the firm can reduce the number of decisions implemented from k_L^* to k_H^* at a price of P. Without this mechanism, it sees $\widetilde{k}$ decisions implemented and pays nothing. Depending on P and the difference between k_H^* and $\widetilde{k}$, one mechanism or another can provide a better reward. We now need to compare the most efficient option mechanism with the best mechanism without (identified by a set of control for the financier from 1 to $\widetilde{k}$).

Proposition 4: There are conditions where the option mechanism dominates.In particular if $\sum_{k_H^*}^{\widetilde{k}} \gamma_k d_k^H \geq (\nu_L + \sum_{k=1}^{\widetilde{k}} \tau_k d_k^H)(R - R_b)$,then the option mechanism will be preferred.

Proof: see Appendix

Hence, as long as the savings in disutility under the option mechanism exceed the probability of success in the bad state, the option mechanism will be preferred to the no-option setting. The key empirical prediction of Proposition 4 is that sometimes the option will not be offered at all. The intuition is that if k_H^* is quite close to $\widetilde{k}$ the benefit of the option is restricted. Also, if ν_L is large, the benefit of being in the high state of nature are less pronounced. This would be most favorable to the straightforward mechanism. Conversely, if the disutility of exercising the option γ_k is large enough or the probability of success in the low state $(\nu_L + \sum_{k=1}^{\widetilde{k}} \tau_k d_k^H)$ is not high, the option mechanism dominates.

In this chapter we have showed the following: i) in the absence of verifiable signals assigns more control rights k_L^* to the financier than implied by the first best $\tilde{k} < k_L^*$. ii) In case a state-contingent, verifiable signal is possible, the firm gives away k_H^* rights in the high state and k_L^* rights in the low state, where $k_H^* < k^* < \tilde{k} < k_L^*$. iii) In the absence of a state-contingent, verifiable signal an option given to the firm to buy back control over all decisions k_H^* to k_L^* at a predetermined price P achieves the same result. iv) There exist conditions under which the option mechanism is optimal and conditions under which is optimal not to grant an option.

The implications of our model are as follows: even though one can only assign state-independent control rights to the financier, giving the entrepreneur the option to buy back control rights in the good state of nature achieves the same results as having state-contingent control rights. The option to buy back control creates quasi state-contingent control rights, allowing us to extend the models of Aghion and Bolton (1992) and Aghion and Tirole (1997).

4 Empirical Analysis

The focus of our empirical analysis is if and how the contractual mechanism described in our theoretical part is found in the real world.

In what follows we look at one particular element of corporate bonds called defeasance. We will first describe what defeasance is, how it works in practice, and finally test whether the use of defeasance corresponds with our theoretical analysis.

4.1 The Data Set

Along the lines of Billet, King, and Mauer (2007), Reisel (2004), and Chava, Kumar, and Warga (2007) we build our data set from the Fixed Investment Securities Database (FISD) to get information for about 11384 corporate bond issues.[3] First, in order to get reliable covenant information, we use all bond issues from 01/01/1989 to 31/12/2007. We only consider regular US corporate bonds, that is we exclude foreign currency denominated bonds or bonds from international issuers in the US. We exclude all government and municipal bonds and also exclude any asset-backed bonds. Finally we exclude private placements and convertible bonds. To ensure that we have covenant information available, we need to ignore medium term notes (MTN) as FISD does not collect covenant information for these types of bonds. Finally, we exclude bonds for which the subsequent information flag in FISD is not set.[4]This leaves us with 11384 corporate issues. In a second step we merge this data with balance sheet information taken from Compustat. We merge by cusip and ticker. This leaves us with 5996 observations. Finally, we use TRACE data to get trading prices and yields to maturity for the issues included in our database for the time period between 01/01/2001 to 31/12/2007.[5] Finally, we use rating information to compute the rating for each traded bond at the end of the year prior to the year it was traded.

4.2 What is defeasance?

Defeasance is defined as the right to remove a bond or the covenants associated with the bond from a firm's balance sheet (Mergent (2004)). The right resides with the issuer, rather than with the bondholders. This is one of the few rights *not* allocated to the bondholder.[6]

In order to remove the covenants, the firm has to pay an amount of cash or government securities that covers the remaining outstanding interest rate payments and the principal into an escrow account. The bond thus becomes riskless. The decision to defease is irrevocable. Normally, only all covenants together can be defeased (Mergent (2004)). We additionally check whether this definition of defeasance corresponds to real indenture agreements found in corporate bonds. We find that the definitions are identical.[7]

[3]Please see table 14 for more details.

[4]According to FISD this includes bonds that were announced but not subsequently issued for example.

[5]This was the earliest date for which trading information was available.

[6]Defeasance actually comes in two flavors: One flavor removes the bond from the balance sheet (so it does not count for example when considering the firm's leverage). This case of defeasance is described by Johnson, Pari, and Rosenthal (1989). The other element of defeasance, which we concentrate on, removes covenants (also called "indentures") so that the firm is not bound any more by the restrictions imposed by these covenants.

[7]See the following extract for an example of a covenant defeasance clause included in a Coca-Cola (2005) issue: "The indenture provides that we may elect either: to defease and be discharged from any and all obligations with respect to the new notes (...) ("defeasance") or to be released from our obligations under the new notes with respect to certain cross-default provisions described in the fifth bullet point under "—Events of Default and Remedies" and the restrictions described under "—Certain Covenants with Respect to the New Notes" ("covenant defeasance"), upon the deposit with the trustee (or other qualifying trustee), in trust for such

This leaves us with three results. The first result is that defeasance is very similar to the option to remove covenants that we describe in the theoretical part. Second, defeasance always removes all covenants of an issue, similar to our proposition that only bundles of covenants should be removed. Finally its shows that the price for defeasance is set ex-ante and requires the issue to be made risk-free. The associated loss (gain) for the bond issuer (bondholder) can be interpreted as the defeasance option's exercise price.

In a next step we present summary statistics. Then we proceed to show that the use of defeasance is positively related to the number of covenants included in a bond. We then show that underwriters do *not* include defeasance on a boiler-plate basis, but rather seem to use them deliberately. Finally, we will show that the use of defeasance leads to a decrease in the yield to maturity between 22 to 87 basis points.

4.3 Summary Statistics

In table 1 we present summary statistics for the 11384 bond issues between 1989 and 2007 that we consider in our sample.[8] We divide the full sample into two subsamples for bonds without and with defeasance. The first thing we can notice is that defeasance is an important element of corporate bonds that occurs in roughly about 63% of all. One conclusion from this is that, as predicted in our model, defeasance is not used in all bond issues, but that there are issues that decide not to include defeasance at all.

What we can see from the summary statistics is that bonds with and without defeasance are substantially different from each other. Bonds with defeasance have higher yields, lower ratings and higher treasury spreads than bonds without a defeasance clause. The difference in yields is about 50 basis points, roughly consistent with a 33 basis points difference in the treasury spread. The difference in ratings is roughly three rating categories, the difference in levels is between BBB+ (Baa1) to BBB- (Baa3), measured on a scale that converts ratings into numerical values (AAA=1, C=21). Also, a larger percentage of bonds that are defeasible are not investment grade. Both types of bonds have covenants attached to them and the vast majority of them are callable. These findings point towards the fact that bonds with defeasance are more risky than those without defeasance.

In table 2 we see that the use of defeasance has been relatively stable in recent years. This was not the case for the early nineties, where defeasance was used for only about 15-17% of all issues. With respect to the use of covenants, one can see a sharp increase from 43% to 97% between 1989 and 1993, but also a a 20% decline between 2003 and 2007, mirroring

purpose, of money and/or U.S. government obligations which, through the payment of principal and interest in accordance with their terms, will provide money in an amount sufficient to pay the principal of and interest, if any, on the new notes on the scheduled due dates for such payments. In the case of defeasance, the holders of new notes will be entitled to receive payments in respect of the new notes solely from such trust". On the other hand Mergent states: "(Covenant Defeasance) gives the issuer the right to defease indenture covenants without tax consequences for bondholders. If exercised, this would free the issuer from covenants set forth in the indenture or prospectus, but leaves them liable for the remaining debt. The issuer must also set forth an opinion of counsel that states bondholders will not recognize income for federal tax purposes as a result of the defeasance" (Mergent (2004)). Brackets added by the authors.

[8] We concentrate on the larger sample of firms that have issued public debt and not only those that are also publicly listed.

the discussion of the covenant "lite" bonds. Interestingly, the quality of issues has increased in recent years, up to 7.4 from 10.47 between 2007 and 2004. Yields have stayed relatively constant while the average spread has increased slightly.

4.4 Control Rights and Defeasance

In a next step we will look whether the use of covenants differs across defeasible and non-defeasible bonds. Table 3 shows the use of all covenants found in the FISD sample for bonds with and without defeasance. Table 4 presents the definitions for each covenant.

The first part of the table shows the unconditional means for all clauses included in the issue. Within the table the use of each covenant varies wildly from virtually no presence (bh12 Declining Net Worth) to almost 90% (ir1 Consolidation Merger).

What is interesting to see is that there are few restrictions tied to balance sheet items, but rather hard restrictions on additional debt, payout policy and mergers. Thus the covenants most frequently found are ones that are very hard to remove in practice as compared to "softer" ones based on balance sheet items. Indeed one could argue that covenants tied to the balance sheet can be considered as state contingent covenants. Only when the firm is in (financial) difficulties, will these covenants be important. Other type of covenants, in particular Asset Sale restrictions and restrictions put on debt issuance can be seen as uncontingent control rights as described in the model.

When we compare the use across bonds with and without defeasance (panels 2 and 3 in table 3) for almost all covenants we find that bonds with defeasance have significantly more covenants than bonds without defeasance. The increase varies across rights, but is large for several rights: the Asset Sale clause increases from 4% to 33% or for payment restrictions from 7% to 41%. The increases are lower for balance sheet related covenants than for both asset sale restrictions and cash restrictions, implying that defeasance allows the firm to include more uncontingent covenants, as predicted by the model.

In table 5 we use Wilcoxson rank-sum tests to see whether the distribution of the number of covenants is different between defeasible and non-defeasible bonds. To this end we construct a distribution for the number of covenants contingent on the presence or absence of defeasance. We find that for both categories of covenants we consider the distributions are significantly different, with more covenants being included in defeasible issues.

As an example, we present table 6, where we show how covenants vary across defeasible and non-defeasible bonds in two-by-two matrices. What is noticeable is the uniform increase in the use of two covenants whenever defeasance is present as compared to its absence. For the asset sale clause and the sale leaseback clause the increase is from 45 to 868 observations, while for the asset sale clause and the sale asset clause it is from 143 to 2130 observations.

Finally, in tables 7 and 8 we regress the number of covenants on defeasance. In order to do so we now consider the reduced sample of firms that are publicly listed by merging issue information with balance sheet data from Compustat. We look at two measures, the number of restrictions on debt issuance and the number of restrictions on asset sales. Following Billet, King, and Mauer (2007), Reisel (2004), and Nash, Netter, and Poulsen (2003) we employ a number of standard control variables to proxy for firm characteristics, including the issue's maturity, EBIT, Cash, the firm's market capitalization, the return on assets, return on asset volatility, fixed assets, seniority, investments and leverage.[9] We first run standard OLS regressions and find that the inclusion of a defeasance option increases the number of covenants significantly, regardless of whether we look at debt issuance restrictions or asset sale restrictions. In a next step we take into account that covenant defeasance might be an endogenous variable. We instrument covenant defeasance with economic defeasance.[10] The relevant results from the first stage regressions are reported below the regression results. We find that in all specifications we run, economic defeasance is highly significant. Also, our initial OLS results are broadly confirmed. We find that regardless of the inclusion of year and industry fixed effects the number of covenants still increases when defeasance is included in the contract. This result is consistent with Lemma 2 and proposition 1 that states that when defeasance is included in the issue, one should find that this allows for more covenants to be included in the issue.

4.5 Robustness

4.5.1 Boilerplate Contracts

One central question asked with respect to any bond indenture is the question of how standardized these agreements are. One point of view is that all these covenants are "boiler-plate" in the sense that there is no individual variation across covenants. This point is problematic: it ignores that the inclusion of a particular covenant may be the outcome of deliberate negotiations between the issuer, the underwriter and the rating agency. Second, it may be the case that in order to facilitate the interpretation of covenants, the wording of each covenant is done in a "boiler-plate" manner, but not the inclusion decision. In order to shine light on this question and to rule out the problem that some underwriter operate in such a "boiler-plate" fashion, we look at how often underwriters include defeasance provisions in their issues. If defeasance would be a boilerplate, we would expect underwriters to include defeasance never or always, hence our distribution should resemble a bernoulli distribution.

In table 9 we look at the empirical distribution of defeasance across underwriters. For each underwriter we compute the mean for the use of defeasance across all issues underwritten by this particular entity. We then consider the empirical distribution function across all underwriters. We find that the use of the defeasance clause varies greatly across underwriters. This suggests that these clauses are used deliberately and not in a "boiler-plate", as in this case we would have expected a bi-modal distribution with most mass concentrated around zero and one.

This is also confirmed when we look at the plot of distribution function for the average use of defeasance across underwriters in figure 1.

[9] Since these variables are not central to our results we refer the reader to the above papers for an interpretation of their economic effects.

[10] Economic defeasance refers to the firm's ability to remove the principal amount and coupon payments from the firm's balance sheet. This would still leave the firm liable to any covenants set forth under the indenture agreement. However, economic defeasance does not remove any covenants. Thus our instrument is related to defeasance, but unrelated to the number of covenants, our dependent variable.

4.5.2 Defeasance and Callability

In table 10 we look at how callability and defeasance interact. Note that there are a lot of missing values in FISD (1125 out of 3682 (32%)) with respect to callability. Given the low number of non-callable bonds, we conjecture that issues with missing data on callability are non-callable. However, we will not assume so in current analysis, but just use the data provided by FISD. We find that most bonds for which we have information on callability can be called (98%). When we split the sample between bonds that are continuously callable (similar to an American Call) and those that are not, we find roughly 65% can always be called. As continuous callability can act as a perfect substitute for defeasance, we look at whether there is a penalty (call premium or make-whole premium (Mergent (2004))) to be paid for early bond retirement. We find that indeed almost all issues have to be called at a premium. This call premium is quite substantial and is a 28 basis point premium on the call amount. Finally, we look at those bonds that cannot be called continuously. We find that almost all of them have an initial quiet period through which the issue cannot be called (900 out of 902). The length of the quiet period is on average 4.69 years or 45% of the average maturity of bonds in our sample. The conclusion we can draw is that while callability seems to be an important tool for firms to manage their liability structure it is not a perfect substitute for defeasance.

4.6 What drives the use of defeasance?

In tables 11 and 12 we look at whether we can shed more light on the question of which firms use defeasance. This is closely linked to proposition 4 of our model. Proposition 4 predicts that firms for which the difference between $\nu_H - \nu_L$, the unconditional probability for the good and bad state of nature is small the option mechanism (defeasance) does not dominate. Thus one would predict that for firms that have a high return on assets, high variability in the return on assets or firms that have growth options will see the condition $\nu_H - \nu_L$ to be fulfilled. This question is closely related to Nash, Netter, and Poulsen (2003) who consider whether firms omit certain covenants in order to retain flexibility in their operations. Following Nash, Netter, and Poulsen (2003) we include the market-to-book ratio in our regressions. Nash, Netter, and Poulsen (2003) find that firms with growth opportunities seem to be more likely to omit dividend or debt restrictions from their issues. The remaining variables we include are the the same proxies for firm characteristics as in table 7 and 8 where we looked at factors influencing the number of covenants.

In table 11 we start with simple OLS regression in which we control for the number of covenants using debt-issuance restriction, the bond's maturity, EBIT, cash, the firm's market cap and boot-to-market ratio, the firm's RoA, the investment amount, the leverage ratio and RoA volatility. We find that the number of debt-issuance restrictions has a positive effect on the use of the defeasance option. Maturity has a negative sign, which is a bit surprising as one would expect that firms with longer maturity bonds are more concerned about potential hold-up. EBIT enters with a positive sign without being significant, while cash is significant enters with a negative sign. This suggests that defeasance is used by firms that have high revenues but low cash at hand. Two out of our three predictors for a large difference in $\nu_H - \nu_L$ turn out to be significant: RoA and RoA volatility while the market-to-book ratio does do not seem to matter. The last result is quite surprising as Nash, Netter, and Poulsen (2003) find that exactly these types of firms are concerned with keeping their operational flexibility. One possible explanation for this result may be that firms with a large market-to-book ratio will rather not include covenants at all than incurring the potentially large cost that defeasance may bring along. Alternatively investors might not believe that these firms will have enough cash to defease an issue in the future.

We then continue to look at whether the number of covenants is endogenous. We instrument the number of covenants with the issue's rating. The issue's rating should be related to the number of covenants, as these directly influence the issue's riskiness. On the other hand, covenant defeasance is not directly affected by the issue's riskiness. We also think we do not create an omitted variable bias by omitting the rating from the second stage regression as we use the firm's z-score to directly control for the firm's riskiness. We report the relevant first stage results below the second stage regressions. Our findings suggest that the factors relevant in the OLS regression continue to explain the use of defeasance.

We then look at how the picture changes once we consider restrictions on asset sales rather than restrictions on asset sales. While we can reconfirm our initial results, our results are somewhat weaker as RoA volatility ceases to be significant. Including time and industry (3-digit SIC) fixed effects does not change the overall picture.

4.7 Pricing

As both suggested by the wording or the actual clauses and also as suggested by model, defeasance has an impact on yields. To see this one can consider defeasance as an American-style call-option held by the borrower: any time during the life-time of the bond, the firm may be in a situation where it is more valuable for the firm to remove the covenants and pay for delivering a risk-less bond to the bondholders. The value of such an option can be considered in the following way:

$$Ev_d = (YTM_{Bond} - YTM_{Treasury}) \cdot p, \tag{1}$$

where Ev_d stands for the expected value of the defeasance option and p stands for probability of defeasance. As this effect will be anticipated by both bondholders and bond issuer, one would expect to see a lower yield for bonds with defeasance, ceteribus paribus. Testing this prediction is also important as it will give us evidence whether defeasance actually matters in the sense that investors take it into account when pricing an issue.[11]

Our methodology is simple: we run the following regression:

$$YTM = \beta_1 \cdot defeasance + \beta_2 \cdot rating + \epsilon_i. \tag{2}$$

[11] Johnson, Pari, and Rosenthal (1989) find at least 49 instances of economic defeasance of US corporate bonds in their sample of defeased bonds between 1980 and 1985. FISD lists 9 bonds as defeased, 7 economic cases of defeasance and 2 cases of legal defeasance. Given the relative high number of cases found by Johnson, Pari, and Rosenthal (1989) we assume that FISD does not seem to an accurate source of information about the actual occurrence of defeasance. Johnson, Pari, and Rosenthal (1989) also mention the occurrence of covenant (legal) defeasance, but do not mention any numbers.

and include both year and maturity fixed effects on all bond trades recorded in TRACE between 2001 and 2007. We use quoted bond prices from TRACE in order to increase the number of observations in our sample. We control for the term structure of interest rates by including dummies for all outstanding maturities. Also, by including year dummies we should be able to control for changes in the treasury spread. Essentially, by including dummies for each maturity separately, we measure the term-structure of interest rates at discrete points but allow it to take any possible shape. We control for riskiness by including the issue's pre issue rating. The impact of covenants should be captured by the rating. Defeasance itself should be independent of the bond's rating, as it does not affect the riskiness of the current bond.

In order to get the covenant information, we match TRACE with FISD. Depending on the specification, this leaves with roughly 3.5 to 10 million observations. In a a first step we concentrate on bonds that only have covenant but no economic defeasance. We consider two different specifications, one where we include all bonds, regardless whether covenants are included or not and regardless of whether the bond is callable. In a second specification, we restrict our attention to non-callable bonds only that have covenants attached. Table 13 shows pricing effects. We find that the inclusion of defeasance leads to a reduction in the yield to maturity of 87 and 81 basis points respectively. This means that investors are willing to accept a significant decrease in the yields required in exchange for the possibility to receive risk-free bonds in the future.

In order to check the robustness of our results, we replicate our findings for issues that include both types of defeasance. The major problem we have with this is that economic defeasance (also called "in-kind defeasance") and covenant defeasance are highly correlated. In fact, they are almost perfectly correlated (their correlation coefficient is 0.83). Therefore it is impossible to include both of them at the same time in a regression. For this reason we only included covenant defeasance in our first specification. Bear in mind that given the high correlation between both variables, our model is not misspecified, but we are not able to disentangle both effects. Thus we are measuring the *joint* effect of both forms of defeasance on yields. Given the clear implications of our model, we can be reasonable sure that at least covenant defeasance should be priced. What we find is that there still seems to be a reduction in yields between 22 to 59 basis points. While this is significantly lower than before, it is still an economically meaningful effect.

Finally, in unreported results we check whether we find similar results for the sample of initial bond issues only. The results are qualitatively and qualitatively comparable and are in range of 16 (Model 5) to 77 basis points (Model 1), depending on the specification.

5 Conclusion

In this paper we argue that one way to solve the problem of renegotiating bond covenants is to give the bond issuer the option to defeasance all of the issue's covenants simultaneously. We present both a theoretical model and empirical evidence that supports our argument. In particular we find that defeasance allows a firm to include more covenants in its issues and that the presence of the defeasance option reduces the issue's yield-to-maturity by 22 to 87 BP on average. We also find that bond issues mainly contain uncontingent covenants, such as restrictions on asset sales or issuance of additional debt. In our model we show that the option to defease control rights is particularly valuable when intermediate signals that would allow for state-contingent control rights in the sense of Aghion and Bolton (1992) are missing. Defeasance allows to create quasi-contingent control rights, as it allows the bond issuer to but-back control in the good state of nature, but not in the bad state.

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Appendix

Proof of Lemma 1:

Define $p_i \equiv \sigma_{iH}\left(\nu_H + \sum_{k=1}^K \tau_k d_k^H\right) + (1-\sigma_{iH})\left(\nu_L + \sum_{k=1}^K \tau_k d_k^L\right)$. Denote by $q_i = \nu_i + \sum_{k=1}^K \tau_k d_k^i$.

Then $p_H - p_L = \Delta\sigma\Delta\nu + \Delta\sigma \sum_{k=1}^K \tau_k(d_k^H - d_k^L)$ and we have:

$$\begin{aligned}
\frac{\partial L}{\partial R_b} &= (\alpha-1)p_H - \lambda\Delta p \\
\frac{\partial L}{\partial d_k^H} &= (\tau_k R - \gamma_k)\left(1 + \lambda\frac{\Delta\sigma}{\sigma_{HH}}\right) + (\alpha-1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_{HH}}\right)\tau_k R_b \\
\frac{\partial L}{\partial d_k^L} &= (\tau_k R - \gamma_k)\left(1 - \lambda\frac{\Delta\sigma}{1-\sigma_{HH}}\right) + (\alpha-1)\left(1 + \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_{HH}}\right)\tau_k R_b
\end{aligned}$$

The equation implies that $\lambda = (\alpha-1)\frac{p_H}{\Delta p}$. Similarly to before $\lambda = 0$ is impossible and $\alpha > 1$. Let us substitute λ in the other partial derivatives,

$$\begin{aligned}
\frac{\partial L}{\partial d_k^H} &= \tau_k R - \gamma_k + (\alpha-1)\left[\tau_k R_b + \frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_{HH}}\left(\tau_k\left(R - R_b\right) - \gamma_k\right)\right] \\
\frac{\partial L}{\partial d_k^L} &= \tau_k R - \gamma_k + (\alpha-1)\left[\tau_k R_b - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_{HH}}\left(\tau_k\left(R - R_b\right) - \gamma_k\right)\right]
\end{aligned}$$

Let us show that $1 < \frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_{HH}}$. Indeed, this is equivalent to:

$$\begin{aligned} \Delta p \sigma_{HH} &< p_H \Delta\sigma \\ &\Leftrightarrow p_H \sigma_{LH} < p_L \sigma_{HH} \end{aligned}$$

This is equivalent to:

$$\left(q_L + \sigma_{HH}(q_H - q_L)\right)\sigma_{LH} < \left(q_L + \sigma_{LH}(q_H - q_L)\right)\sigma_{HH}$$

or $\sigma_{LH} < \sigma_{HH}$, which is true. As $\frac{\partial L}{\partial d_k^H} \geq 0$, iff

$$(\tau_k R - \gamma_k)\left(1 + (\alpha - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_{HH}}\right) + (\alpha - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_{HH}}\right)\tau_k R_b \geq 0$$

$$\Leftrightarrow \frac{\tau_k R}{\gamma_k} \geq 1 - (\alpha - 1)\frac{1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_{HH}}}{\left(1 + (\alpha - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_{HH}}\right)}\frac{\tau_k R_b}{\gamma_k}$$

there will some decisions for which $\frac{\tau_k R}{\gamma_k} \geq 1$ and $\frac{\partial L}{\partial d_k^H} \leq 0$. ■

Proof of Lemma 2:

- Take:

$$\frac{\partial L}{\partial d_k^L} = \tau_k R - \gamma_k + (\alpha - 1)\left[\tau_k R_b - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_{HH}}\left(\tau_k\left(R - R_b\right) - \gamma_k\right)\right]$$

This can be rewritten as

$$\frac{\partial L}{\partial d_k^L} = (\tau_k R - \gamma_k)\left(1 - (\alpha - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_{HH}}\right) + (\alpha - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_{HH}}\right)\tau_k R_b$$

and so $\frac{\partial L}{\partial d_k^L} \geq 0$, iff

$$(\tau_k R - \gamma_k)\left(1 - (\alpha - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_{HH}}\right) \geq -(\alpha - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_{HH}}\right)\tau_k R_b$$

Notice first that

$$1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_{HH}} \geq 0 \Leftrightarrow$$

$$(p_H - p_L)(1 - \sigma_{HH}) - p_H \Delta\sigma \geq 0 \Leftrightarrow$$

$$\Delta\sigma\Delta q(1 - \sigma_{HH}) - p_H \Delta\sigma \geq 0 \Leftrightarrow$$

$$\Delta q(1 - \sigma_{HH}) - (q_L + \sigma_{HH}\Delta q) \geq 0 \Leftrightarrow$$

$$q_H - q_L - \sigma_{HH} q_H + q_L \sigma_{HH} - q_L - \sigma_{HH} q_H + \sigma_{HH} q_L \geq 0 \Leftrightarrow$$

$$q_H \geq 0$$

which is true. There are potentially two cases to consider.

- Case 1: $1 - (\alpha - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_{HH}} \geq 0$. Then, we have that $\frac{\partial L}{\partial d_k^L} \geq 0$, iff

$$\frac{\tau_k R}{\gamma_k} \geq 1 - \frac{(\alpha - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_{HH}}\right)\tau_k R_b}{\left(1 - (\alpha - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_{HH}}\right)\gamma_k}$$

There will decisions for which $\frac{\tau_k R}{\gamma_k} < 1$ but still $d_k^L = 1$. This implies $k_L^* > k^*$.

- Case 2: $1 - (\alpha - 1)\frac{p_H}{\Delta_p}\frac{\Delta\sigma}{1-\sigma_{HH}} < 0$. Then, we have that $\frac{\partial L}{\partial d_k^L} \geq 0$, iff

$$\frac{\tau_k R}{\gamma_k} \leq 1 - \frac{(\alpha - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_{HH}}\right)\tau_k R_b}{\left((\alpha - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_{HH}} - 1\right)\gamma_k}$$

and then we would give in fact control over the decisions from $\widehat{k}$ to K, with $\widehat{k} > k^*$. Notice though that for all k,

$$\sigma_{HH}\frac{\partial L}{\partial d_k^H} + (1 - \sigma_{HH})\frac{\partial L}{\partial d_k^L} = \tau_k R - \gamma_k + (\alpha - 1)\tau_k R_b$$

Therefore,

$$\sigma_{HH}\frac{\partial L}{\partial d_k^H} + (1 - \sigma_{HH})\frac{\partial L}{\partial d_k^L} \geq 0 \Leftrightarrow$$
$$\frac{\tau_k R}{\gamma_k} \geq 1 - \frac{(\alpha - 1)\tau_k R_b}{\gamma_k}$$

Take a decision k for which $\frac{\tau_k R}{\gamma_k} \geq 1$. Then we cannot have both $d_k^H = 0$ and $d_k^L = 0$ as the last inequality implies that at least one of the partial derivative must be positive. But we have seen that necessarily $k_H^* \leq k^*$. Moreover if case 2 obtains, we would have decisions between k^* and $\widehat{k}$ where $d_k^L = 0$. So for those decisions, we would have both $d_k^H = 0$ and $d_k^L = 0$, a contradiction. ■

Proof of Proposition 4

The expected payoff to the firm in the the high state under the option mechanism is the firm's result minus the payment to the lender and the price for defeasance:

$$(\nu_H + \sum_{k=1}^{k_H^*}\tau_k d_k^H)(R - R_b) + \sum_{k=1}^{k_H^*}\gamma_k d_k^H - (\nu_L + \sum_{k=1}^{k_H^*}\tau_k d_k^H)(R - R_b) = \Delta\nu(R - R_b) - \sum_{k=1}^{k_H^*}\gamma_k d_k^H$$

If the firm were not not have defeasance, it would receive the following returns:

$$(\nu_H + \sum_{k=1}^{\widetilde{k}}\tau_k d_k^H)(R - R_b) - \sum_{k=1}^{\widetilde{k}}\gamma_k d_k^H$$

Then

$$
\begin{aligned}
\Delta\nu(R - R_b) - \sum_{k=1}^{k_H^*} \gamma_k d_k^H &\geq (\nu_H + \sum_{k=1}^{\widetilde{k}} \tau_k d_k^H)(R - R_b) - \sum_{k=1}^{\widetilde{k}} \gamma_k d_k^H \\
\sum_{k_H^*}^{\widetilde{k}} \gamma_k d_k^H &\geq (\nu_L + \sum_{k=1}^{\widetilde{k}} \tau_k d_k^H)(R - R_b) \quad \blacksquare
\end{aligned}
$$

Table 1: Bond Issuance: Summary Statistics

Variable	Obs	Mean	STD	Min	Max
Full Sample					
Amount	11384	434362	2432261	1	1.00e+08
Price	8067	98.65	7.12	1.38	108.998
Offering Yield	7207	6.84	1.93	0	19
Treasury Spread	6545	118.72	96.48	0	978
Callable	7355	0.97	0.18	0	1
Covenants	11384	0.91	0.28	0	1
Offering Year	11384	2000	4.23	1962	2007
Maturity (in Years)	11384	11.60	10.43	1	100
Investment Grade	11384	0.68	0.47	0	1
Rating	11384	9.14	4.30	1	25
Defeasance	10375	0.63	0.48	0	1
No Defeasance					
Amount	3843	473572	2560886	1000	1.00e+08
Price	3185	98.26	8.30	12.94	104.28
Offering Yield	2945	6.60	1.75	0	19.00
Treasury Spread	2614	101.72	74.96	0	755.00
Callable	2116	0.95	0.23	0	1
Covenants	3843	1.00	0.00	0	1
Offering Year	3843	1999	4.23	1971	2007
Maturity (in Years)	3843	13.10	11.12	1	100
Investment Grade	3843	0.82	0.39	0	1.00
Rating	3843	7.87	3.65	1	25.00
Defeasance					
Amount	6532	413387	2419952	1	1.00e+08
Price	3930	98.78	6.15	17.04	109.00
Offering Yield	3779	7.10	2.01	0	17.57
Treasury Spread	3503	133.68	109.05	0	978.00
Callable	4940	0.98	0.14	0	1
Covenants	6532	1.00	0.01	0	1
Offering Year	6532	2000	3.81	1986	2007
Maturity (in Years)	6532	11.16	9.78	1	100
Investment Grade	6532	0.56	0.50	0	1
Rating	6532	10.49	4.22	1	25.00

Notes: In this table we look at a sample of 11384 US long-term industrial corporate bonds found in the FISD database issued between 1962 and 2007. The data excludes issues for which no covenant information was available, such as medium-term notes. Also, financial firms or utilities are excluded form the sample. In the first panel we present information about the complete panel. We then split the sample into two parts, the second panel shows the subsample of bonds that come with a covenant defeasance clause, while the third panel shows the subsample of bonds that come without defeasance. We provide information about the offering amount, the issue price, the yield as of the offering date, the spread over a comparable treasury bond, whether the bond is callable and whether there are covenants attached to the bond. the year the bond was issued, its maturity in years, it's rating on a numerical scale from 1 (AAA) to 21 (C) and whether the bond can be defeased or not.

Table 2: Summary Stats: Per Year Averages

Year	Amount	Maturity	Yield	Spread	Rating	Callable	Covenants	Defeasance
1989	329429	20.71	10.11	0.95	7.43	0.50	0.43	0.33
1990	145658	24.22	9.95	1.03	6.78	0.75	0.78	0.43
1991	165965	19.03	8.76	0.96	6.11	0.93	0.76	0.15
1992	142995	14.45	7.98	0.80	6.57	0.80	0.90	0.17
1993	175599	15.45	7.33	0.65	7.85	0.89	0.97	0.35
1994	179096	11.75	8.09	0.63	8.96	0.89	0.97	0.53
1995	193689	13.68	7.63	1.02	8.03	0.90	0.94	0.56
1996	216068	14.11	7.54	0.99	8.84	0.98	0.96	0.61
1997	223968	13.84	7.37	0.97	10.21	0.98	0.97	0.70
1998	260768	12.79	6.95	1.29	9.88	0.98	0.96	0.71
1999	549893	9.62	7.11	1.58	9.69	0.99	0.97	0.68
2000	1129768	8.55	7.55	1.74	8.50	0.97	0.93	0.51
2001	833930	10.09	6.48	1.96	8.58	0.97	0.95	0.59
2002	583628	10.26	6.18	1.79	9.23	0.99	0.94	0.65
2003	443344	11.37	5.04	1.13	9.60	0.98	0.93	0.66
2004	360006	9.86	5.14	1.17	10.47	0.97	0.87	0.76
2005	363166	9.42	5.69	1.17	9.65	0.97	0.79	0.82
2006	640625	9.97	6.09	1.36	8.56	0.98	0.72	0.70
2007	482794	10.28	5.86	1.28	7.40	0.94	0.72	0.70

Notes: In this table we look at the yearly breakdown of our sample of 11384 US long-term industrial corporate bonds found in the FISD database issued between 1989 and 2007. We concentrate on issues after 1989, as FISD started to track issues systematically after this date. The data excludes issues for which no covenant information was available, such as medium-term notes. Also, financial firms or utilities are excluded form the sample. We provide information about the offering amount, the issue price, the yield as of the offering date, the spread over a comparable treasury bond, whether the bond is callable and whether there are covenants attached to the bond. the year the bond was issued, its maturity in years, it's rating on a numerical scale from 1 (AAA) to 21 (C) and whether the bond can be defeased or not.

Table 3: Covenants Use: Summary Statistics I

		All			Defeasance						Diff	
					No			Yes				
FISD Code	Variable	Obs	Mean	Std	Obs	Mean	Std	Obs	Mean	Std	Δ	Sig
	Asset Sale Restrictions											
bh18	Asset Sale Clause	10375	0.22	0.42	3843	0.04	0.19	6532	0.33	0.47	0.29	***
ir9	Sales Leaseback	10375	0.36	0.48	3843	0.22	0.42	6532	0.44	0.50	0.21	***
ir10	Sales Assets	10375	0.89	0.31	3843	0.76	0.43	6532	0.97	0.18	0.20	***
ir12	Stock Issuance	10375	0.02	0.14	3843	0.01	0.10	6532	0.03	0.16	0.02	***
	Balance Sheet Restrictions											
bh12	Declining Net Worth	10375	0.00	0.07	3843	0.00	0.06	6532	0.00	0.07	0.00	
ir6	Maintenance Net Worth	10375	0.02	0.15	3843	0.01	0.09	6532	0.03	0.18	0.02	***
ir16	Net Earnings Test Issuance	10375	0.03	0.18	3843	0.09	0.28	6532	0.00	0.06	-0.08	***
ir17	Fixed Charge Coverage	10375	0.01	0.10	3843	0.00	0.07	6532	0.01	0.11	0.01	***
ir18	Leverage Test	10375	0.00	0.04	3843	0.00	0.02	6532	0.00	0.04	0.00	**
	Cash Restrictions											
ir5	Investments	10375	0.02	0.14	3843	0.01	0.12	6532	0.03	0.16	0.01	***
ir7	Restricted Payments	10375	0.28	0.45	3843	0.07	0.26	6532	0.41	0.49	0.33	***
ir2	Dividend Related Payments	10375	0.05	0.22	3843	0.08	0.27	6532	0.03	0.18	-0.04	***
ir15	Transaction Affiliates	10375	0.28	0.45	3843	0.09	0.28	6532	0.40	0.49	0.31	***
ir13	Stock Transfer	10375	0.07	0.26	3843	0.05	0.23	6532	0.09	0.28	0.03	***
	Debt Restrictions											
bh2	Negative Pledge	10375	0.64	0.48	3843	0.49	0.50	6532	0.73	0.44	0.24	***
ir3	Funded Debt	10375	0.01	0.11	3843	0.02	0.15	6532	0.01	0.07	-0.02	***
ir4	Indebtedness	10375	0.33	0.47	3843	0.09	0.29	6532	0.47	0.50	0.37	***
ir11	Senior Debt Issuance	10375	0.01	0.11	3843	0.00	0.05	6532	0.02	0.13	0.01	***
ir14	Subordinated Debt Issuance	10375	0.05	0.23	3843	0.01	0.11	6532	0.08	0.27	0.07	***
	Others											
bh5	Cross Default	10375	0.05	0.22	3843	0.12	0.32	6532	0.01	0.12	-0.10	***
bh6	Cross Acceleration	10375	0.60	0.49	3843	0.39	0.49	6532	0.72	0.45	0.33	***
bh7	Change Control Put	10375	0.34	0.47	3843	0.19	0.39	6532	0.42	0.49	0.23	***
bh10	Rating decline	10375	0.01	0.12	3843	0.02	0.13	6532	0.01	0.12	0.00	
ir1	Consolidation Merger	10375	0.90	0.31	3843	0.77	0.42	6532	0.97	0.17	0.20	***

Notes: This table shows the distribution of the various covenants in a sample of 11384 US corporate Bonds. Detailed explanations are given in table 4. We categorize all covenants according to their function into five categories. The first category looks at restrictions on asset sales, the second looks at restrictions that are based on balance sheet items, the third looks at restrictions on the use of the issuer's cash, the fourth looks at restrictions on (additional) debt issuance, while the fifth category looks at those that do not fall in any of the other four.

Table 4: Covenant Definitions

FISD Code	FISD Name	Description
		Asset Sale Restrictions
bh18	Asset Sale Clause	Covenant requiring the issuer to use net proceeds from the sale of certain assets to redeem the bonds at or above par.
ir9	Sales Leaseback	Restricts issuer to the type or amount of property used in a sale leaseback transaction and may restrict its use of the proceeds of the sale.
ir10	Sales Assets	Restricts an issuer's ability to sell assets or restricts the issuer's use of the proceeds from the sale of assets. Requires the issuer to apply some or all of the sales proceeds to the repurchase of debt through a tender offer or call.
ir12	Stock Issuance	Restricts issuer from issuing additional common stock.
		Balance Sheet Restrictions
bh12	Declining Net Worth	If issuer's net worth (as defined) falls below minimum level, certain bond provisions are triggered.
ir6	Maintenance Net Worth	Issuer must maintain a minimum specified net worth.
ir16	Net Earnings Test Issuance	To issue additional debt the issuer must have achieved or maintained certain profitability levels.
ir17	Fixed Charge Coverage	Issuer is required to have a ratio of earnings available for fixed charges, of at least a minimum specified level.
ir18	Leverage Test	Restricts total-indebtedness of the issuer.
		Cash Restrictions
ir2	Investments	Indicates that payments made shareholders or other entities may be limited to a percentage of net income or some other ratio.
ir5	Restricted Payments	Restricts issuers investment policy to prevent risky investments.
ir7	Dividend Related Payments	"Restricts issuer's freedom to make payments (other than dividend related payments) to shareholders and others."
ir15	Transaction Affiliates	Issuer is restricted in certain business dealings with its subsidiaries.
ir13	Stock Transfer	Restricts the issuer from transferring, selling, or disposing of its own common stock or the common stock of a subsidiary.
		Debt Restrictions
bh2	Negative Pledge	The issuer cannot issue secured debt unless it secures the current issue on a pari passu basis.
ir3	Funded Debt	Restricts issuer from issuing additional funded debt. Funded debt is any debt with an initial maturity of one year or longer.
ir4	Indebtedness	Restricts issuer from incurring additional debt with limits on absolute dollar amount of debt or percentage total capital.
ir11	Senior Debt Issuance	Restricts issuer to the amount of senior debt it may issue in the future.
ir14	Subordinated Debt Issuance	Restricts issuance of junior or subordinated debt.
		Others
bh5	Cross Default	Allows holder to activate an event of default in their issue, if default has occurred for any other debt of the company.
bh6	Cross Acceleration	Allows holder to accelerate their debt, if any other debt of the issuer has been accelerated due to an event of default.
bh7	Change Control Put	Upon a change of control in the issuer, bondholders have the option of selling the issue back to the issuer (poison put). Other conditions may limit the bondholder's ability to exercise the put option.
bh10	Rating decline	A decline in the credit rating of the issuer (or issue) triggers a bondholder put provision.
ir1	Consolidation Merger	Indicates that a consolidation or merger the issuer with another entity is restricted. of

Notes: This table presents explanations for the various covenants in a sample of 11384 US corporate Bonds. We categorize all covenants according to their function into five categories. The first category looks at restrictions on asset sales, the second looks at restrictions that are based on balance sheet items, the third looks at restrictions on the use of the issuer's cash, the fourth looks at restrictions on (additional) debt issuance, while the fifth category looks at those that do not fall in any of the other four.

Table 5: Covenants Use: Summary Statistics III

	Asset Sale Restrictions				Debt Restrictions			
No of Cov.	No	Yes	Sig	Total	No	Yes	Sig	Total
0	823	140		963	1,727	665		2,392
1	2,143	2,319		4,462	1,890	3,684		5,574
2	834	3,212		4,046	197	1,759		1,956
3	43	861		904	29	417		446
4					0	7		7
Total	3,843	6,532	***	10,375	3,843	6,532	***	10,375

Notes: In table 5 we use Wilcoxson rank-sum tests to see whether the distribution of covenants is different between defeasible and non-defeasible bonds for our sample of 11384 US corporate bonds. To this end we construct a distribution for the number of covenants contingent on the presence or absence of defeasance. We then test whether the distributions are statistically different. We consider three restrictions on asset sales (Asset Sale Clause (bh18), Sales Leaseback (ir9), and Sales Assets (ir10)) and debt restrictions (Funded Debt (ir3), Indebtedness (ir4), Senior Debt Issuance (ir11), and Subordinated Debt Issuance (ir14)).

Table 6: Bond Issuance: Summary Statistics

		IR9 Sale Leaseback		IR 10 Sale Assets Clause	
		No	Yes	No	Yes
Bh18 Asset Sale					
No Defeasance					
	No	2,880	812	903	2,789
	Yes	106	45	8	143
Defeasance					
	No	2,396	1,987	191	4,192
	Yes	1,281	868	19	2,130
IR 10 Sale Assets					
No Defeasance					
	No	829	82		
	Yes	2,157	775		
Defeasance					
	No	152	58		
	Yes	3,525	2,797		

Notes: We use cross tabulations of whether covenants occur jointly conditional on defeasance being used in the issue or not. We consider the use of three closely related covenants that regulate the sale of assets by the bond issuer: Asset Sale Clause (bh18) a covenant requiring the issuer to use net proceeds from the sale of certain assets to redeem the bonds at or above par This covenant does not limit the issuers right to sell assets. Sales Leaseback (ir9) restricts issuer to the type or amount of property used in a sale leaseback transaction and may restrict its use of the proceeds of the sale. Sales Assets (ir10) restricts an issuer's ability to sell assets or restricts the issuer's use of the proceeds from the sale of assets. Requires the issuer to apply some or all of the sales proceeds to the repurchase of debt through a tender offer or call.

Table 7: Defeasance: Number of Covenants I

Dependent Variable:	Debt Issuance Restrictions			
	OLS	2SLS	2SLS	2SLS
Defeasance	0.48***	0.18***	0.17***	0.17***
	(0.02)	(0.05)	(0.05)	(0.05)
Maturity	0.00***	0.00***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
EBIT	-5.21E-05***	-5.07E-05***	-5.10E-05***	-4.96E-05***
	(1.48E-05)	(1.48E-05)	(1.51E-05)	(1.53E-05)
Cash	-1.22***	-1.42***	-1.40***	-1.37***
	(0.16)	(0.17)	(0.17)	(0.18)
Market Cap.	-3.24E-07	-5.12E-07	-4.21E-07	-3.89E-07
	(6.96E-07)	(6.87E-07)	(7.05E-07)	(7.00E-07)
Market to Book	-0.04**	-0.05**	-0.05**	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)
Fixed Asset Ratio	-0.04	-0.11*	-0.10	-0.11
	(0.06)	(0.07)	(0.07)	(0.07)
RoA	0.07	0.21	0.21	0.19
	(0.32)	(0.35)	(0.36)	(0.36)
Investments	0.62***	0.75***	0.66***	0.68***
	(0.21)	(0.21)	(0.21)	(0.22)
Leverage	0.46***	0.44***	0.44***	0.44***
	(0.12)	(0.13)	(0.13)	(0.13)
RoA Volatility	0.93	1.20*	1.23*	1.23*
	(0.66)	(0.72)	(0.73)	(0.71)
Seniority	-0.38***	-0.38***	-0.38***	-0.37***
	(0.04)	(0.04)	(0.04)	(0.04)
Z-Score	4.31E-05***	3.60E-05***	3.17E-05***	3.08E-05***
	(3.54E-06)	(3.92E-06)	(4.41E-06)	(5.56E-06)
Constant	1.60***	2.15***	2.49***	1.63***
	(0.20)	(0.22)	(0.20)	(0.39)
First Stage				
Economic Def.		-0.65***	-0.66***	-0.65***
		(0.02)	(0.02)	(0.02)
Year FE	No	No	Yes	Yes
Industry FE	No	No	No	Yes
Number of obs	3065	3065	3065	3064
F/ χ^2	73.81	454.23	7.7e+09	2.9e+12
Prob > F	0.00	0.00	0.00	0.00
R-squared	0.26	0.22	0.23	0.28
Root MSE	0.60	0.62	0.62	0.59

Notes: We run OLS and 2SLS regressions with the number of covenants as the dependent variable. Following Billet, King, and Mauer (2007) we aggregate related covenants. We focus on Debt Issuance Restrictions (maximum 4, sum of Funded Debt (ir3), Indebtedness (ir4), Senior Debt Issuance (ir11), and Subordinated Debt Issuance (ir14)). Our main dependent variable is a dummy for defeasance. In specification 2-4 we run a 2SLS regression where we instrument for (covenant defeasance) with a dummy variable for economic defeasance. Economic defeasance is a dummy variable that takes value one when the issue can be removed from the issuers balance sheet while still leaving him responsible for all covenants from the issue (Mergent (2004)). Thus, while economic defeasance is related to covenant defeasance, it is unrelated to the number of covenants included in the issue. First stage results for our instrumental variable are shown below the main results. We also relate our dependent variables to other explanatory factors that have been proposed by Billet, King, and Mauer (2007), Reisel (2004) and Chava, Kumar, and Warga (2007) to be relevant for the inclusion of covenants in an issue. In some regressions we include year and industry fixed-effects (3-digit SIC codes). Robust Standard errors in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 8: Defeasance: Number of Covenants II

Dependent Variable:	Asset Sale Restrictions			
	OLS	2SLS	2SLS	2SLS
Defeasance	0.50***	0.32***	0.30***	0.29***
	(0.02)	(0.06)	(0.06)	(0.06)
Maturity	0.00***	0.00***	0.00**	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
EBIT	-4.30E-05***	-4.22E-05***	-4.43E-05***	-5.35E-05***
	(1.63E-05)	(1.63E-05)	(1.68E-05)	(1.60E-05)
Cash	-0.69***	-0.81***	-0.86***	-0.83***
	(0.15)	(0.16)	(0.16)	(0.16)
Market Cap.	-1.22E-10	-1.12E-07	-3.89E-07	1.06E-07
	(7.31E-07)	(7.21E-07)	(7.31E-07)	(7.14E-07)
Market to Book	-0.03	-0.03*	-0.03	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)
Fixed Asset Ratio	-0.56***	-0.61***	-0.59***	-0.59***
	(0.06)	(0.07)	(0.06)	(0.07)
RoA	0.22	0.31	0.30	0.32
	(0.24)	(0.25)	(0.24)	(0.24)
Investments	0.99***	1.06***	1.15***	1.16***
	(0.23)	(0.23)	(0.23)	(0.23)
Leverage	0.03	0.02	-0.01	-0.01
	(0.08)	(0.08)	(0.08)	(0.08)
RoA Volatility	1.59***	1.75***	1.60***	1.43***
	(0.48)	(0.51)	(0.49)	(0.48)
Seniority	0.09***	0.08**	0.10***	0.12***
	(0.03)	(0.03)	(0.03)	(0.03)
Z-Score	3.57E-05***	3.15E-05***	2.66E-05***	2.24E-05***
	(3.53E-06)	(3.79E-06)	(4.23E-06)	(5.12E-06)
Constant	0.75***	1.08***	-0.34**	-0.21
	(0.14)	(0.18)	(0.16)	(0.35)
First Stage				
Economic Def.		-0.65***	-0.66***	-0.65***
		(0.02)	(0.02)	(0.02)
Year FE	No	No	Yes	Yes
Industry FE	No	No	No	Yes
Number of obs	3345	3065	3065	3064
F/ χ^2	55.46	888.24	3.9e+11	6.9e+12
Prob > F	0.00	0.00	0.00	0.00
R-squared	0.17	0.17	0.19	0.26
Root MSE	0.61	0.61	0.60	0.58

Notes: We run OLS and 2SLS regressions with the number of covenants as the dependent variable. Following Billet, King, and Mauer (2007) we aggregate related covenants. We focus on Asset Sale Restrictions (maximum 3, sum of Asset Sale Clause (bh18), Sales Leaseback (ir9), and Sales Assets (ir10)). Our main dependent variable is a dummy for defeasance. In specification 2-4 we run a 2SLS regression where we instrument for (covenant defeasance) with a dummy variable for economic defeasance. Economic defeasance is a dummy variable that takes value one when the issue can be removed from the issuers balance sheet while still leaving him responsible for all covenants from the issue (Mergent (2004)). Thus, while economic defeasance is related to covenant defeasance, it is unrelated to the number of covenants included in the issue. First stage results for our instrumental variable are shown below the main results. We also relate our dependent variables to other explanatory factors that have been proposed by Billet, King, and Mauer (2007), Reisel (2004) and Chava, Kumar, and Warga (2007) to be relevant for the inclusion of covenants in an issue. In some regressions we include year and industry fixed-effects (3-digit SIC codes). Robust Standard errors in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 9: Defeasance: Usage across underwriters

Obs	318	Percentiles	Value	Percentiles	Value
Min	0	1%	0.00	75%	0.47
Max	1	5%	0.09	90%	0.51
Mean	0.38	10%	0.23	95%	0.54
Std. Dev.	0.13	25%	0.29	99%	0.60
		50%	0.42		

Notes: We look at the empirical distribution of defeasance across underwriters. For each underwriter we compute the mean for the use of defeasance across all issues underwritten by this particular entity. We then consider the empirical distribution function across all underwriters.

Figure 1: The Average Use of Defeasance across Underwriters

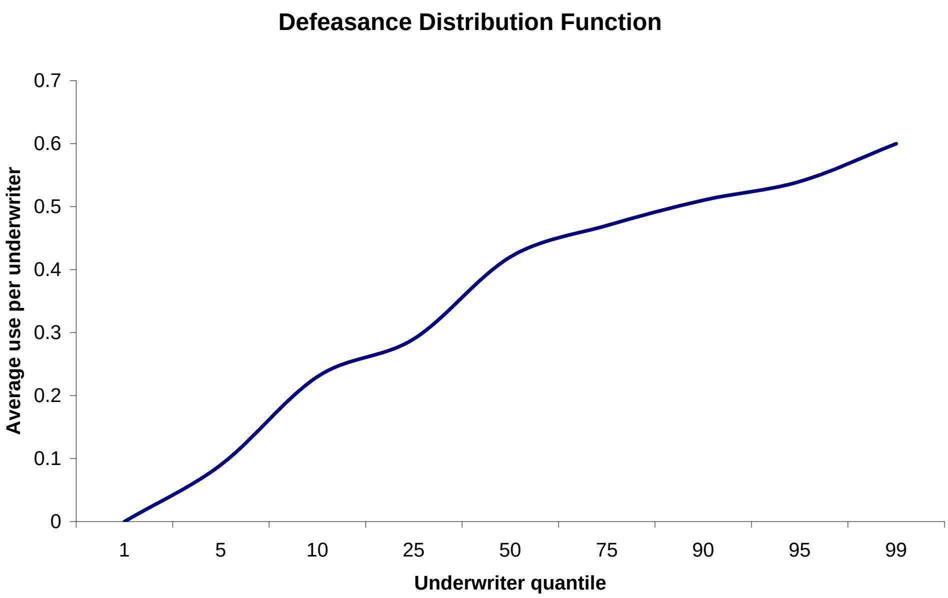

Table 10: Callability as Substitute for Defeasance?

	Defeasance: Yes			
	No		Yes	
	#	%	#	%
Callable	56	0.02	2,557	0.98
Continuously Callable	906	0.35	1,652	0.65
Continuously Callable at premium	6	0.00	1,646	1.00
	#	BP		
Call Premium (in BP) if Continuously Callable	1592	28.19		
	No		Yes	
	#	%	#	%
Not Continuously Callable have Quiet Period upfront	2	0.00	900	1.00
	#	Years		
Length of quiet Period in years	900	4.69		
	#	%		
Length of quiet Period relative to maturity (in %)	900	0.45		

Notes: In this table we look at how callability and defeasance interact. Conditionally on defeasance being present we first check how many bonds are callable. We then check whether we have an American Exercise setup (continuous) or a European (discrete). For those issues that are continuously callable we check whether this comes with a prepayment penalty (call premium or make-whole premium (Mergent (2004)). Finally, we look at the average premium to be paid (in BP). For those issues that are not continuously callable we check whether they have a quiet period before the call can be exercised for the first time. We then compute the length of the quiet period in years and as a percentage of the issue's maturity. Note that there are a lot of missing values in FISD (1,125 out of 3682 (32%)) with respect to callability. Given the low number of non-callable bonds, we conjecture that issues with missing data on callability are non-callable.

Table 11: Use of Defeasance I

Dependent Variable:		Defeasance		
	OLS	2SLS	2SLS	2SLS
Debt Issuance Restrictions	0.26***	0.29***	0.23***	0.21***
	(0.01)	(0.04)	(0.04)	(0.04)
Maturity	0.00*	0.00	0.00**	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
EBIT	1.71E-05	1.90E-05	1.32E-05	1.96E-05*
	(1.17E-05)	(1.18E-05)	(1.18E-05)	(1.17E-05)
Cash	-0.27***	-0.21*	-0.31***	-0.31***
	(0.09)	(0.12)	(0.12)	(0.12)
Market Cap.	-4.54E-07	-4.31E-07	-3.56E-07	-5.79E-07
	(5.25E-07)	(5.30E-07)	(5.32E-07)	(5.48E-07)
Market to Book	-0.01	0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Fixed Assets	-0.19***	-0.19***	-0.16***	-0.14***
	(0.04)	(0.04)	(0.04)	(0.04)
RoA	0.40***	0.39***	0.43***	0.42***
	(0.12)	(0.12)	(0.12)	(0.12)
Investments	0.21	0.18	0.09	0.14
	(0.13)	(0.14)	(0.13)	(0.13)
Leverage	-0.18***	-0.20***	-0.18***	-0.15***
	(0.04)	(0.04)	(0.04)	(0.05)
RoA Volatility	0.53**	0.48*	0.63**	0.54**
	(0.26)	(0.26)	(0.26)	(0.26)
Seniority	0.09***	0.11***	0.10***	0.09***
	(0.02)	(0.02)	(0.02)	(0.02)
Z-Score	-3.13E-05***	-3.25E-05***	-3.13E-05***	-3.26E-05***
	(2.51E-06)	(2.83E-06)	(2.97E-06)	(3.87E-06)
Constant	1.17***	1.08***	0.60***	-0.17
	(0.08)	(0.13)	(0.14)	(0.23)
First Stage				
Rating		0.07***	0.07***	0.07***
		(0.01)	(0.01)	(0.01)
Year FE	No	No	Yes	Yes
Industry FE	No	No	No	Yes
Number of obs	3065	3065	3065	3064
F/ χ^2	646.40	7867.40	1.3e+12	5.9e+13
Prob > F	0.0000	0.00	0.00	0.00
R-square d	0.1522	0.15	0.17	0.24
Root MSE	.43904	0.44	0.43	0.42

Notes: We run OLS and 2SLS regressions with the defeasance as the dependent variable. Our main dependent variable are Asset Sale RestWe focus on Debt Issuance Restrictions (maximum 4, sum of Funded Debt (ir3), Indebtedness (ir4), Senior Debt Issuance (ir11), and Subordinated Debt Issuance (ir14)). In specification 2-4 we run a 2SLS regression where we instrument for the number of covenants with the issue's rating. The issue's rating should not be related to defeasance as it depends only on the issue's risk. In order to ensure proper identification we proxy for the firm and issue risk by including the firm's Z-score, the issue's maturity and seniority directly into the regression. First stage results for our instrumental variable are shown below the main results. We also relate our dependent variables to other explanatory factors that have been proposed by Billet, King, and Mauer (2007), Reisel (2004) and Chava, Kumar, and Warga (2007) to be relevant for the inclusion of covenants in an issue. In some regressions we include year and industry fixed-effects (3-digit SIC codes). Robust Standard errors in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 12: Use of Defeasance II

Dependent Variable:	Defeasance			
	OLS	2SLS	2SLS	2SLS
Asset Sale Restrictions	0.26***	0.44***	0.41***	0.38***
	(0.01)	(0.07)	(0.08)	(0.08)
Maturity	0.00**	0.00	0.00**	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
EBIT	1.51E-05	2.25E-05*	1.97E-05	2.86E-05***
	(1.15E-05)	(1.23E-05)	(1.23E-05)	(1.21E-05)
Cash	-0.40***	-0.21*	-0.22*	-0.24*
	(0.09)	(0.12)	(0.13)	(0.13)
Market Cap.	-5.32E-07	-4.77E-07	-2.52E-07	-6.51E-07
	(5.27E-07)	(5.64E-07)	(5.75E-07)	(5.61E-07)
Market to Book	-0.01	0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Fixed Assets	-0.06	0.07	0.08	0.07
	(0.04)	(0.07)	(0.07)	(0.07)
RoA	0.35***	0.27**	0.31**	0.31**
	(0.13)	(0.13)	(0.13)	(0.13)
Investments	0.11	-0.11	-0.26	-0.18
	(0.13)	(0.17)	(0.17)	(0.17)
Leverage	-0.07	-0.07	-0.07	-0.05
	(0.04)	(0.04)	(0.04)	(0.04)
RoA Volatility	0.34	-0.02	0.16	0.20
	(0.28)	(0.32)	(0.32)	(0.31)
Seniority	-0.02	-0.04***	-0.03*	-0.04*
	(0.02)	(0.02)	(0.02)	(0.02)
Z-Score	-2.94E-05***	-3.38E-05***	-3.29E-05***	-3.25E-05***
	(2.58e-06)	(3.09E-06)	(3.24E-06)	(3.83E-06)
Constant	1.37***	1.07***	1.21***	1.36***
	(0.08)	(0.14)	(0.07)	(0.33)
First Stage				
Rating		0.04***	0.04***	0.04***
		(0.00)	(0.01)	(0.01)
Year FE	No	No	Yes	Yes
Industry FE	No	No	No	Yes
Number of obs	3065	3065	3065	3064
F/ χ^2	621.53	7018.89	1.6e+11	1.8e+12
Prob > F	0.00	0.00	0.00	0.00
R-square d	0.16	0.10	0.13	0.22
Root MSE	0.44	0.45	0.44	0.42

Notes: We run OLS and 2SLS regressions with the defeasance as the dependent variable. Our main dependent variable are Asset Sale Restrictions. Following Billet, King, and Mauer (2007) we aggregate related covenants. We focus on Asset Sale Restrictions (maximum 3, sum of Asset Sale Clause (bh18), Sales Leaseback (ir9), and Sales Assets (ir10)). In specification 2-4 we run a 2SLS regression where we instrument for the number of covenants with the issue's rating. The issue's rating should not be related to defeasance as it depends only on the issue's risk. In order to ensure proper identification we proxy for the firm and issue risk by including the firm's Z-score, the issue's maturity and seniority directly into the regression. First stage results for our instrumental variable are shown below the main results. We also relate our dependent variables to other explanatory factors that have been proposed by Billet, King, and Mauer (2007), Reisel (2004) and Chava, Kumar, and Warga (2007) to be relevant for the inclusion of covenants in an issue. In some regressions we include year and industry fixed-effects (3-digit SIC codes). Robust Standard errors in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 13: Defeasance: impact on YTM of bonds

	Dependent Variable: Yield to maturity					
	Only Covenant Defeasance				Both Forms of Defeasance	
	Full Sample		10 year bonds only			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Defeasance	-0.8778***	-0.8085***	-0.7336***	-0.7945***	-0.2231***	-0.5701***
	(0.0042)	(0.0039)	(0.0026)	(0.0040)	(0.0015)	(0.0022)
Rating	0.1434***	0.2508***	0.2216***	0.2522***	0.4297***	0.3702***
	(0.0004)	(0.0013)	(0.0008)	(0.0013)	(0.0003)	(0.0009)
Maturity F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Covenants only	No	Yes	No	Yes	No	Yes
Callable	Yes	No	Yes	No	Yes	No
Number of obs	4814019	3502856	4484276	3404962	10006270	5466045
F-Test	72940	83695	26144	29863	98142	44982
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.2428	0.3645	0.2921	0.3508	0.3683	0.3411
Root MSE	2.0555	1.7898	1.8792	1.7844	2.4375	1.8733

Notes: We run an OLS regression with the YTM as the left hand variable and defeasance as the right hand variable with robust standard errors. Each regression includes a fixed effect for all outstanding maturities from one to ten years:

$$YTM = \beta_1 \cdot defeasance + \beta_1 \cdot rating + \delta_1 \cdot maturity + \delta_2 \cdot year + \epsilon_i. \quad (3)$$

In panel 1 we included both non-callable and callable bonds as well as bonds with and without covenants. We use pre-issue ratings. Panel 2 excludes bonds that have no covenants attached and includes both callable and non-callable bonds. We use the most current ratings available. In panel 3 we exclude bonds that have no covenants attached and exclude all non-callable bonds. We use the most current ratings available. YTM is windsorized at the one percent level in order to remove outliers. All coefficients are in percentages. Robust Standard errors in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 14: Sample Construction

Sample construction	
All FISD Issues (31/12/2007)	208730
Keep Industrials and Telecom Firms	-110378
Keep US Issues	-12970
- Drop Canadian Issues in the US	-26
- Drop Non-US issues in the US	-1232
Keep Debentures	-53175
Keep if Subsequent Info available	-10006
Keep if Public Issue (no rule 144 PP)	-4389
Use Bond Type table to eliminate:	
Remaining MTNs:	-10
No Preferred Securities	-61
US Corporate Debentures	=16554
	-5170
Merge with rating table, keep if rating info present	=11384
	-5388
Merge with Compustat (Ticker and Cusip)	=5996
Compustat variable definitions	
EBIT (Earnings before Interest and Taxes)	=ib
Cash	=che/at
Market Capitalization	=prcc_c*csho
RoA (Return on Assets)	=oibdp/at
Investments	=capx/at
Leverage	=(at-seq)/at
Market-to-Book Ratio	=(at-ceq+MarketCap)/at
Fixed Assets	=ppent/at
Z-Score	= 3.3*EBIT/at+sale/at+1.4*re/at+ 1.2*(act-lct)/at+0.6*MarketCap/(dltt+dlc)

Notes: This table describes how we construct our sample from the universe of bond issues collected in FISD. As we are only interested in public (non-convertible) corporate US debentures issued we eliminate various Non-US and Non-Corporate issues. In the second part of the table we describe our definitions of various variables based on Compustat items. We use the new Xpressfeed definitions rather than the old numerical data items.