Covenant removal in corporate bonds

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Abstract

Corporate bonds include action-limiting covenants that may prevent the firm from undertaking valuable growth opportunities *ex-post* but are virtually impossible to negotiate. We study the covenant defeasance option, which effectively mitigates this inefficiency by allowing the firm to remove the covenants. Our model predicts and our empirical analysis confirms that (1) financially constrained firms with high uncertainty are more likely to include this option; (2) with the defeasance option, issuers are willing to accept more action-limiting covenants *ex ante*; and (3) investors require lower yield on non-callable bonds and higher yield on standard callable bonds that are defeasible.

Keywords: Financial contract design, corporate bonds, action-limiting covenants, covenant defeasance option, callability, bond yields

JEL Classification: G32, D86, G12.

1 Introduction

Corporate bonds are an important source of funding for public firms.[1] Like bank loans, most bonds contain negative covenants that restrict certain actions, such as debt issuance, mergers, and asset sales.[2] These action-limiting covenants, which are included to protect bondholders, can be *ex-post* inefficient by preventing the firm from taking advantage of valuable investment opportunities. However, unlike bank loans, bond indentures are nearly impossible to renegotiate[3] and very costly to violate.[4] To provide valuable flexibility, the majority of US corporate bonds have a little-known provision: the covenant defeasance clause, which allows the issuer to immediately remove all covenants without retiring the bond itself.

This paper is the first to theoretically and empirically analyze the decision to include the covenant defeasance option in corporate bonds. We show that a bond with action-limiting covenants and the defeasance option is an optimal contract when states are non-verifiable. Our model predicts that financially constrained issuers with high uncertainty and valuable growth options are more likely to include this option, as are bonds with more covenants. It also explains why investors require lower yield for including the covenant defeasance option in a non-callable bond but higher yield if the bond includes a standard call option. We test the model in a large sample of US corporate bonds and find strong support for the predictions.

In our model, which builds on Aghion and Bolton (1992), Holmström and Tirole (1997), and Tirole (2006), the issuer trades off the *ex-ante* benefits of action-limiting covenants against their *ex-post* costs. Action-limiting covenants increase the pledgable income of a financially constrained issuer by restricting actions that are detrimental to bondholders in certain states. However, if states are not

[1]See, e.g., Colla, Ippolito, and Li (2020).

[2]For evidence on covenants in corporate bonds, see, e.g., Smith and Warner (1978), Nash, Netter, and Poulsen (2003), Billet, King, and Mauer (2007), and Chava, Kumar, and Warga (2010). Bank loans in addition contain financial covenants. See, e.g., Chava and Roberts (2008), Nini, Smith, and Sufi (2009), Drucker and Puri (2005), Demiroglu and James (2010), Becker and Ivashina (2016), Berlin, Nini, and Yu (2020), and Ivashina and Vallee (2020).

[3]See, e.g., Bolton and Jeanne (2007) and Bradley and Roberts (2015). The dispersed bond ownership combined with the US Trust Indenture Act of 1939, which requires a supermajority to modify a bond indenture, effectively hinders renegotiation, and firms cannot vote repurchased bonds. In contrast, bank loans are often renegotiated (Roberts and Sufi, 2009; Roberts, 2015) and allow penalty-free prepayment (Eckbo, Su, and Thorburn, 2022).

[4]In 2019, Aurelius Capital Management sued Windstream, Inc. for violating a sale-leaseback covenant in one of its bonds. After a US district judge ruled in favor of Aurelius, triggering all Windstream's debt to default, the company filed for bankruptcy (Wall Street Journal, February 25, 2019). Windstream's lawyers claimed the hedge fund pushed for default to collect on its credit-default swaps. See also Kahan and Rock (2009) for the role of hedge funds in enforcing covenants.

verifiable, an issuer with insufficient pledgable income to secure financing without restricting actions in some states will have to give up these actions in all states. Yet, such unconditional covenants can be very costly *ex-post* by preventing the issuer from investing in valuable growth opportunities in other states.

We show that this tradeoff can be improved by granting issuers the option to remove covenants *ex post* in states where doing so is harmless to bondholders. The strike price is set sufficiently high for the issuer to exercise the option only when the investment opportunity is value-increasing for all parties. Hence, the action-limiting covenants grant bondholders protection in low states, while the defeasance option enables the issuer to remove the covenants when the actions are harmless to bondholders. It follows that financially constrained issuers facing valuable growth opportunities and a high degree of uncertainty are more likely to include the defeasance option. Moreover, bonds containing more covenants are more likely to be defeasible.

Exercising the covenant defeasance option requires the issuer to deposit in an escrow account sufficient cash and US government securities to pay all future interest and principal on schedule, essentially rendering the bond risk-free. Thus, if the defeasance option is included in a non-callable bond, the bond will become near risk-free with some probability, hence, reducing the *ex-ante* default risk. Our model, therefore, predicts that bondholders require lower yield for a non-callable bond that is defeasible compared to one that is not.

Covenants can also be removed by calling and redeeming a callable bond (Kraus, 1973, 1983).[5] However, calling a bond typically takes 30–60 days, while covenant defeasance can be executed right away. On the other hand, defeasance is more costly to exercise than a call. This is because the future payments are discounted at the risk-free rate in defeasance, implying a strike price above par. In contrast, standard-callable bonds are typically exercised at par, whereas make-whole bonds often are called above market-value (Elsaify and Roussanov, 2016), at a price closer to that of covenant defeasance.[6]

[5]Callability is often viewed as a means to mitigate agency problems (Barnea, Haugen, and Senbet, 1980; Bodie and Taggart, 1978; Crabb and Helwege, 1994; Thatcher, 1984). Narayanan and Lim (1989) and Billet, King, and Mauer (2007) show that issuers call bonds to eliminate covenants. For evidence on callable bonds, see also Mitchell (1991), Jarrow, Li, Liu, and Wu (2010), and Xu (2018). Bond repurchases may be an alternative to callability (Julio, 2013) but take considerable time (Mann and Powers, 2003) and require covenant defeasance of the remaining outstanding bonds.

[6]The strike price for a make-whole call is the maximum of the par value and a proxy for the bond's market value, computed by discounting the remaining interest and principal at a Treasury rate plus a low spread.

Our model shows that there are states in which callable bonds would be called only if they are also defeasible. In these states, issuers will defease the covenants right away and call their bonds at the same time to redeem them at a later date, thereby reducing the cost of defeasance. So, covenant defeasance complements callability by enabling the issuer to seize investment or refinancing opportunities that expire soon. Since these bonds will be called in more states than other callable bonds—and investors face a refinancing risk when the bond is called—our model predicts that investors require higher yield on a standard callable bond that includes the defeasance option. However, because investors are largely shielded from refinancing risk in a make-whole call, inclusion of the defeasance option in a make-whole bond will lower the *ex ante* default risk and, hence, lower the required yield.

We test the model predictions in a sample of 5,000 US straight corporate bond issues from Mergent Fixed Investment Securities Database (FISD), 1983–2019. Three-quarters of the sample bonds include the covenant defeasance option and 82% are callable—10% are standard callable, 42% make-whole callable, and 30% "mixed make-whole", i.e., make-whole callable for an initial period and standard callable for the remainder of the bond's life. We distinguish between the different types of callable bonds in the empirical analysis since they have different implications for the yield required to include the covenant defeasance option.

The predictions of our model are supported by the data. We first examine the decision to include the covenant defeasance option in the bond contract. We use market-to-book and sales growth as proxies for growth opportunities and the dispersion of analysts' forecasts for uncertainty. To measure financial constraints, we use the Kaplan and Zingales (1997) and Whited and Wu (2006) indexes, and firm size following Hadlock and Pierce (2010). As predicted, we find that bonds issued by financially constrained firms facing relatively high uncertainty are more likely to be defeasible. Moreover, the higher the number of covenants—in particular, those restricting asset sales and debt issuance—the more likely is the bond to include the defeasance option.

We next study the impact of defeasance inclusion on the issuance yield spread in a cross-sectional ordinary least square (OLS) regression. Again as predicted, bondholders accept lower yield for a non-callable bond that is defeasible. This result holds after controlling for the number of covenants, which in themselves are associated with lower yield (Miller and Reisel, 2012; Reisel, 2014). Our regression estimates imply about 14 basis points (bps) lower yield for non-callable bonds that include the defeasance option, corresponding to a total interest reduction of almost $8 million for the average bond in our sample. Also as predicted, inclusion of the defeasance option has a similar impact on the issuance yield of a make-whole bond as that of a non-callable bond. However, it increases the average yield spread of a standard callable bond with about 30 bps in addition to the higher yield required for the call option itself. This evidence complements extant studies showing that standard callable bonds are issued at higher yields than non-callable bonds.[7] Overall, our regression results support the model predictions of lower issuance yield from defeasance inclusion in non-callable bonds and make-whole bonds, and higher yield in standard callable bonds.

A concern with the yield regression is that the characteristics determining the decision to include the defeasance option in themselves could explain the yield differential. In the empirical analysis, we deal with this endogeneity in two ways. First, we employ the propensity score matching procedure of Rosenbaum and Rubin (1983) and Abadie and Imbens (2006, 2016). That is, we select otherwise similar defeasible and non-defeasible bonds and compare the difference in issuance yield of the matching pairs. Our estimates indicate that, across the entire sample, defeasible bonds tend to be issued at lower yields than non-defeasible bonds.

Second, we use the two-stage estimation procedure proposed by Lee (1978) and adopted for bond yields by, e.g., Goyal (2005), Miller and Reisel (2012), and Bradley and Roberts (2015). The first step estimates the probability of defeasance inclusion and the second step estimates the yield spread, controlling for the inverse Mills ratio from the first step. Again, bonds are on average issued at a lower yield spread if they include the defeasance option. More importantly, the inverse Mills ratio is insignificant, suggesting that the coefficient estimates of the standard OLS are unbiased. Finally, to rule out reverse causality—that issuers include the defeasance option in response to the lower yield—we regress the decision to include the defeasance option on the implied yield differential predicted from the second step. We find that the coefficient for the yield differential is insignificant, which fails to support reverse causality, consistent with our model.

We know of only two extant papers in the academic literature that analyze covenant defeasance, but do so in different contexts than ours. Dierker, Quan, and Torous (2005) model the defeasance option in securitized commercial mortgages, which allows borrowers to access their accumulated equity. Further,

[7] See, e.g., Mann and Powers (2003), Jarrow, Li, Liu, and Wu (2010), and Becker, Campello, Thell, and Yan (2018).

Asquith and Wizman (1990) study the effect of defeasance protection on bond returns in LBOs, but without examining the defeasance option itself. We provide a theoretical model and empirical analysis of action-limiting bond covenants and the covenant defeasance option.

The rest of the paper is organized as follows. Section 2 provides an institutional background, while Section 3 develops the model and derives predictions. The empirical testing strategy is presented in Section 4 and the empirical analysis in Section 5. Section 6 offers concluding remarks. Extension of the model, proofs, and additional tables are in the Appendix.

2 Institutional Background

Covenant defeasance allows a firm to immediately strip a bond issue of its covenants by depositing into an escrow account cash and government securities that can pay all future bond payments on schedule. According to FISD, 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 but leaves them liable for the remaining debt* [...] *defeasance occurs when the issuer places in an escrow account money or U.S. government securities sufficient to match the remaining interest and principal payments of the current issue*" (Mergent, 2004). Exercise of the defeasance option eliminates bondholders' default risk and, hence, the bond becomes virtually risk-free.[8]

There is no systematic data on the exercise of the defeasance option. The SEC does not require issuers to report and FISD does not store historical data on covenant defeasance. As a result, we are unable to provide reliable statistics on the actual use of the defeasance option. However, in connection with major corporate events, issuers sometimes report covenant defeasance in their 8-K filings. To shed more light on covenant defeasance, we do a textual search of issuers' 8-K filings on EDGAR for keywords related to defeasance option exercise through the year 2019. This search produced a sample of 57 bond covenant defeasance exercises between 1994 and 2013, associated with 49 unique events (a firm sometimes exercises defeasance for multiple bonds at the same time). We supplement this data with information on new bond issues, mergers, and asset sales from Refinitiv SDC Platinum.

[8] The term "defeasance" can also refer to economic and in-substance defeasance. These remove the bond from the balance sheet by placing cash and marketable securities with a trustee to cover principal and interest, but the covenants remain. We only study covenant defeasance.

See Appendix Table 1 for these defeased bonds and the purpose of the covenant defeasance that we identified.

Many US corporate bonds are both callable and defeasible. In our sample of defeasance exercise, 55% of the bonds were defeased and called at the same time. In such cases, the funds placed in escrow must generate the principal, interest, and any call premium up to the redemption date only, substantially reducing the cost of covenant defeasance. To illustrate, Tommy Hilfiger USA Inc. announced that "*it intends to effect later today a covenant defeasance of all of its outstanding 2031 Senior Bonds* [...] *Pursuant to the covenant defeasance, the Company will deposit U.S. government obligations and cash in an irrevocable trust with the Wilmington Trust Company, as trustee, in an amount sufficient to provide for the redemption of the 2031 Senior Notes on December 4, 2006 according to their terms at 100% of their principal amount, plus accrued and unpaid interest up to but not including the date of redemption. When effective, the covenant defeasance will remove the restrictive covenants in the Indenture... In connection with the covenant defeasance, the Company has authorized the redemption on December 4, 2006 of all 2031 Senior Bonds*".[9]

Covenant defeasance exercises often follow tender offers or repurchases to remove covenants on the remaining bonds. These constitute 27% of the exercises in our sample. For example, in 2006, Aleris, "*announced today that it has completed its previously announced tender offer to purchase for cash any and all of its outstanding 10 3/8% Senior Secured Notes Due 2010* [...] *Through the expiration of the tender offer, $200,830,000 principal amount, or 96.17%, of the outstanding principal amount of the 10 3/8% Notes, and the consents related thereto, have been validly tendered* [...] *Aleris today announced that it is depositing funds with JPMorgan Chase Bank, N.A., as trustee under the indenture for the 10 3/8% Notes to effect a covenant defeasance, which terminated its obligations with respect to substantially all of the remaining restrictive covenants on the 10 3/8% Notes".*[10]

We are able to identify a reason for the covenant defeasance in 52 (91%) of the 57 cases. Half of these cases are associated with mergers and acquisitions (M&A), 38% with new debt issuance, and 10% with major asset sales. As an example of new debt issuance, Greyhound Lines in 2005 "*announced that it has deposited funds with JPMorgan Trust Company, under the indenture for its 11.5% senior*

[9] `https://www.sec.gov/Archives/edgar/data/888747/000134100406001390/nyc1116745-5.htm`.
[10] `https://www.sec.gov/Archives/edgar/data/202890/000119312506158311/dex992.htm`.

notes due 2007 to effect a covenant defeasance, which will remove all of the restrictive covenants on the notes. The covenant defeasance was commenced in conjunction with [the parent company] *Laidlaw International's comprehensive plan to recapitalize its balance sheet*".[11]

As discussed above, exercise of covenant defeasance requires the issuer to deposit cash and government securities in an escrow account to generate the future interest and principal payments on schedule. We are able to identify the funding source for 32 (56%) of the 57 defeasance exercises. Most of these are funded by the issuance of new securities: 72% by bond or loan issues and 16% by preferred or common equity issues. Only 9% of the defeasance exercises are financed from the firm's cash on hand. Also, concerning the timing of defeasance, it is exercised relatively evenly throughout the life of the bond, with half of the exercises taking place within five years of issuance.

The stylized facts raise several questions. Which firms include the defeasance option? Are defeasible bonds optimal contracts? What is the yield effect of defeasance inclusion? How do defeasance and callability interact? Our goal is to address these questions theoretically and empirically.

3 The Model

3.1 Model setup

There are two parties: a firm run by an owner-manager and a risk-neutral financier. The firm has a project that requires an investment of I at date 0. The firm has only $A < I$ to invest and wishes to borrow $I - A$ from the financier. At date 2, the project generates a payoff Y of either $R > 0$ (success), in which case the loan is paid back in full, or zero (failure). After the investment is made, the manager decides how much effort to exert. Effort is a binary variable $e \in \{e_L, e_H\}$ that is neither observable nor verifiable. High effort e_H increases the probability of success but costs the manager a private disutility, Q. With low effort the project is negative NPV. At date 1 (the interim state), after effort has been exerted, both parties observe a non-verifiable signal $s \in \{L, H\}$. The signal is a sufficient statistic for the state and indicative of project success $Prob(Y = R|s) = \nu_s$, where $\nu_H > \nu_L$. The interim signal depends on effort, such that $Prob(s|e) = \sigma_s^e$, where $\sigma_s^H > \sigma_s^L$. For effort e, the *ex-ante*

[11] https://www.sec.gov/Archives/edgar/data/813040/000129993305003232/htm_5585.htm.

probability of success is $\overline{\nu}^e = \sigma^e_H \nu_H + \sigma^e_L \nu_L$.

After the signal is observed, but before the payoffs are realized, some (*ex-ante* non-contractible) growth opportunities may become available for the firm. The growth options will expire before date 2 if the firm does not undertake them. The manager can take 1 to K actions to realize these opportunities. She may sell or acquire assets, merge with another firm, issue new debt, etc. These actions will generate future expected payments to shareholders, but may also hurt debtholders.[12]

The financial contract may assign the financier control over some of these actions, forbidding the manager to undertake them. This is equivalent to writing action-limiting covenants in a bond contract. Denote by $d_k \in \{0,1\}$ the allocation of control over action k, for all $k = \{1,...,K\}$, so $d_k = 1$ and $d_k = 0$ indicate that action k is controlled by the financier and the firm, respectively. Giving the financier control over action k increases the *ex ante* repayment probability by τ_k:

$$Prob(Y = R|s) = \nu_s + \sum_{k=1}^{K} d_k \tau_k. \tag{1}$$

The benefits of limiting some of the manager's actions accrue to both the financier and the firm, since it increases the firm's pledgeable income *ex ante*. However, allocating the financier control also comes at a cost, which is borne entirely by the firm. When the firm's actions are restricted, the firm may not be able to take advantage of its (non-contractible) growth-opportunities *ex post*. We denote this opportunity cost by γ_k.

Following Tirole (2006), we assume that the costs and benefits of the actions are independent of the signal realization. We rank the actions by their benefit-to-cost ratio $\frac{\tau_k R}{\gamma_k}$ from high to low, so $k = 1$ is the action with the highest benefit-to-cost ratio. Granting the financier control over action k is efficient if and only if the expected payoff from the action exceeds the opportunity cost, $\frac{\tau_k R}{\gamma_k} \geq 1$. Let k^* denote the last efficient (first-best) decision, such that $\frac{\tau_{k^*} R}{\gamma_{k^*}} \geq 1$ and $\frac{\tau_{k^*+1} R}{\gamma_{k^*+1}} < 1$.

The interesting case is when a firm has insufficient pledgeable income so it cannot fund the project

[12] For example, bondholders may suffer if a distressed firm sells assets and use the proceeds to pay dividends to shareholders.

without giving up more than the efficient number of control rights, $\tilde{k} > k^*$. Formally,

$$\left(\overline{\nu}^e + \sum_{k=1}^{k^*} d_k \tau_k\right) R_b < I - A \qquad \text{and} \qquad \left(\overline{\nu}^e + \sum_{k=1}^{\tilde{k}} d_k \tau_k\right) R_b \geq I - A, \tag{2}$$

where R_b is the debt payment at date 2 and the lender breaks even. We focus on this special case of a financially constrained firm in our analysis below.

3.2 When the allocation of control is irreversible

In this section, we derive an optimal financial contract when the covenants cannot be removed, so the allocation of control is irreversible: a non-defeasible bond with action-limiting covenants. The contract specifies the repayment R_b at date 2 and the set of actions k controlled by the financier. The optimal contract induces high effort from the manager.

The manager then maximizes the expected payoff given high effort

$$\max_{R_b, d_k} \left(\overline{\nu}^H + \sum_{k=1}^{K} d_k \tau_k\right)(R - R_b) - \sum_{k=1}^{K} \gamma_k d_k. \tag{3}$$

Incentive compatibility requires the manager to be better off exerting high effort and incurring Q than exerting low effort. Since the actions k and the opportunity cost γ_k are independent of effort, the incentive compatibility (IC) constraint is

$$\text{IC:} \;\; \overline{\nu}^H (R - R_b) - Q \geq \overline{\nu}^L (R - R_b), \tag{4}$$

which simplifies to

$$R_b \leq R - \frac{Q}{\overline{\nu}^H - \overline{\nu}^L}, \tag{5}$$

where $\overline{\nu}^H - \overline{\nu}^L$ is the difference in the probability of project success between high and low effort. The individual rationality (IR) constraint requires that the financier accepts the contract if and only if

$$\text{IR:} \quad \left(\overline{\nu}^H + \sum_{k=1}^{K} d_k \tau_k\right) R_b \geq I - A. \tag{6}$$

One can think of the bond payment R_b as consisting of a face value of $I - A$ and an interest rate of $\frac{1}{\nu^H} - 1$, which is payable at maturity and compensates the lender for the default risk. The optimal contract maximizes the firm's payoff in (3) subject to (4) and (6).

Since a financially constrained firm has insufficient pledgeable income at the first-best contract (R_b, k^*), it must give the financier control over more actions, $\tilde{k} > k^*$ to receive funding for the project.[13] However, this contract $(R_b, \tilde{k})$ is inefficient because it limits the firm's ability to exploit future growth opportunities for which $\frac{\tau_k R}{\gamma_k} < 1$. We summarize this special case from Tirole (2006) in Result 1.

Result 1: *Suppose that the firm has insufficient pledgeable income as in (2). If the interim state is non-verifiable and in the absence of renegotiation, allocating the financier control over actions* 1 *to* $\tilde{k}$, *where* $\tilde{k} > k^*$, *and the firm controlling the other decisions is optimal.*

Proof: See Appendix.

3.3 Endogenous allocation of control and the covenant defeasance option

We propose that the efficiency of the bond contract in Result 1 can be improved if allocation of control could differ across states. To show this, we first derive the optimal contract for the case when states are verifiable and the actions k controlled by the financier could be made state-contingent. Let the binary variable $d_{sk} = 1$ if the financier controls action k in state s. Moreover, let $\overline{d}_k^e = \sigma_H^e d_{Hk} + \sigma_L^e d_{Lk}$ be the *ex-ante* probability that the financier controls action k given effort e. The manager's optimization problem then becomes

$$\max_{R_b, d_{Hk}, d_{Lk}} \left(\overline{\nu}^H + \sum_{k=1}^{K} \overline{d}_k^H \tau_k \right) (R - R_b) - \sum_{k=1}^{K} \overline{d}_k^H \gamma_k. \tag{7}$$

The IC constraint requires that

$$\text{IC:} \quad \left(\overline{\nu}^H + \sum_{k=1}^{K} \overline{d}_k^H \tau_k \right) (R - R_b) - \sum_{k=1}^{K} \overline{d}_k^H \gamma_k - Q \geq \left(\overline{\nu}^L + \sum_{k=1}^{K} \overline{d}_k^L \tau_k \right) (R - R_b) - \sum_{k=1}^{K} \overline{d}_k^L \gamma_k, \tag{8}$$

[13] We assume that there are sufficiently many control rights to allocate between the issuer and the financier so the differences between $\frac{\tau_k R}{\gamma_k}$ and $\frac{\tau_{k+1} R}{\gamma_{k+1}}$ are small enough for $\tilde{k} > k^*$ to hold with strict inequality.

which simplifies to

$$R_b \leq R - \frac{Q + \sum_{k=1}^{K}(\overline{d}_k^H - \overline{d}_k^L)\gamma_k}{\overline{\nu}^H - \overline{\nu}^L - \sum_{k=1}^{K}(\overline{d}_k^H - \overline{d}_k^L)\tau_k}, \tag{9}$$

and the modified IR constraint for the financier is

$$\text{IR:} \quad \left(\overline{\nu}^H + \sum_{k=1}^{K} \overline{d}_k^H \tau_k\right) R_b \geq I - A. \tag{10}$$

The optimal state-contingent contract (R_b, k_H^*, k_L^*) maximizes (7) subject to (8) and (10). In the rest of the paper, we only focus on covenant-restricted actions, for which $d_k = 1$, so we will omit d_k from the model. Our first lemma derives the optimal allocation of state-contingent control rights.

Lemma 1: *If the interim state were contractible, it is optimal to assign the financier control over actions 1 through k_H^* in state H and actions 1 through k_L^* in state L, where $k_L^* > \widetilde{k} > k^* > k_H^*$.*

Proof: See Appendix.

Lemma 1 states that the optimal bond contract with state-contingent control rights has fewer covenants in state H, $k_H^* < \tilde{k}$, and more covenants in state L, $k_L^* > \tilde{k}$, than in the case of irreversible control. The intuition is as follows. The issuer prefers to have more control in both states. For the financier, in contrast, having control is more valuable in state L than state H, since the likelihood that it incurs a loss *ex post* is greater in state L than in state H. Hence, the optimal contract allocates the financier more control rights in state L than in state H, i.e. $k_L^* > k_H^*$. The state-contingent contract $\{R_b^*, k_L^*, k_H^*\}$, which we refer to as the constrained-efficient contract, dominates the contract $\{R_b, \tilde{k}\}$ in Result 1.

How can state-contingent allocation of control rights be implemented when the interim state is non-verifiable? Proposition 1 describes an optimal mechanism: the covenant defeasance option.

Proposition 1 (covenant defeasance): *If the interim state is non-verifiable, the following mechanism can implement the constrained-efficient contract. At the time of the issue (1) grant the financier control over k_L^* decisions; and (2) give the firm an option to buy back control over decisions $k_H^* + 1$ to k_L^* at an exercise price P^*, such that the option can be exercised only in state H.*

It follows from Proposition 1 that the issuer of a defeasible bond accepts k_L^* covenants upfront, and if valuable growth opportunities come along in state H, then it exercises the covenant defeasance option to buy back covenants, effectively implementing the constrained-efficient contract. If $k_H^* = 0$, then it is efficient for the firm to remove *all* covenants in state H. This case best describes the actual covenant defeasance option included in corporate bonds, which removes all covenants at once. Hence, the optimal bond contract when states are non-verifiable includes both action-limiting covenants (increasing the issuer's pledgeable income *ex ante*) and the covenant defeasance option (allowing the issuer to remove the covenants *ex post*).

To derive the optimal exercise price P^*, recall that the project generates no cash at the interim date. Since at date 1 the effort choice has been made, pledgeable income has increased, and the firm has additional debt capacity, r_{bs}. In state H, the issuer can raise additional debt up to $r_{bH} = (\nu_H + \sum_{k=1}^{k_L^*} \tau_k)(R - R_b)$, and in state L, up to $r_{bL} = (\nu_L + \sum_{k=1}^{k_L^*} \tau_k)(R - R_b)$, a lesser amount. Recall from Proposition 1 that P^* must be high enough so the option can be exercised only in state H.

Proposition 2 (exercise price): *Assume that* $\epsilon > 0$ *is arbitrarily small and*

$$r_{bH} \geq \sum_{k=k_H^*+1}^{k_L^*} \tau_k R_b. \tag{11}$$

Then the option mechanism implements the constrained-efficient allocation if

$$P^* \geq \max\{r_{bL} + \epsilon; \sum_{k=k_H^*+1}^{k_L^*} \tau_k R_b\} \tag{12}$$

If $r_{bH} < \sum_{k=k_H^*+1}^{k_L^*} \tau_k R_b$, *the issuer cannot afford the option exercise.*

From Proposition 2, the optimal exercise price P^* must exceed what the issuer can afford to pay in state L (the first term of (12)) and the financier's value of controlling decisions $k_H^* + 1$ through k_L^* in state H (the second term). To provide optimal incentives, the firm should be rewarded as generously as possible in state H. This is obtained by charging the lowest possible exercise price, given the IC condition (11) and the IR condition ($P^* > r_{bL}$), or the option will be exercised in state L. Proposition 2 also implies that there must be one price to remove all covenants, otherwise, the firm could remove individual covenants in state L.

Next, we show that there is a positive relationship between the number of control rights granted to investors and the inclusion of the covenant defeasance option.

Proposition 3 (defeasance inclusion): *Bonds with more covenants are more likely to be defeasible.*

Proof: See Appendix.

Since the optimal non-defeasible bond grants investors control over $\widetilde{k}$ decisions, a financially constrained issuer would agree to more covenants only if they could be removed in state H. In state L, the financier would control $k_L^* > \widetilde{k}$ decisions because the option would not be exercised.

Proposition 4 shows that the issuer exercises the option in state H if the value of non-contractible growth opportunities that would otherwise expire exceeds P^*.

Proposition 4 (defeasance exercise): *The issuer is willing to take control of decisions $k_H^* + 1$ through k_L^* in state H if*

$$\sum_{k_H^*+1}^{k_L^*} \gamma_k \geq P^*. \tag{13}$$

Proof: See Appendix.

Proposition 2 and 4 imply that the issuer would exercise the option if the exercise is affordable, i.e. if the value of non-contractible growth opportunities that would otherwise expire, $\sum_{k_H^*+1}^{k_L^*} \gamma_k$, is large enough and/or the probability of success in state L, $\nu_L + \sum_{k=1}^{k_L^*} \tau_k$, is relatively small, and the financier's benefit of controlling these decisions in state H is small. The issuer will not exercise the option if the gain from controlling decisions k_H^* to k_L^* is relatively small and/or the probability of success in state L is large, and if the difference between state H and state L is less pronounced.

The next step is to derive the yield difference h between the optimal non-defeasible bond B^* and the optimal defeasible bond B^{**}.

Proposition 5 (yield): *If both (11) and (13) hold, then the yield difference between B^* and B^{**} is*

$$h = R_{b^*} - R_{b^{**}} = \frac{\sigma_H^H \left(P^* - \sum_{k=k_H^*+1}^{\tilde{k}} \tau_k R_{b^{**}}\right) + \sigma_L^H \sum_{k=\tilde{k}+1}^{k_L^*} \tau_k R_{b^{**}}}{\overline{\nu}^H + \sum_{k=1}^{\tilde{k}} \tau_k} > 0. \tag{14}$$

Hence, the optimal defeasible bond demands lower yield than the optimal non-defeasible bond.

Proof: See Appendix.

The first term in the numerator is the financier's expected cost of the option exercise in state H (the probability of state H times the difference between the exercise price and the value of the covenants $k_H^* + 1$ through $\tilde{k}$ given up in state H). The second term is the expected value to the financier of controlling actions $\tilde{k} + 1$ through k_L^* in state L. The payments are scaled by the probability of repayment (the denominator). The yield difference depends positively on the expected exercise price, negatively on the financier's expected loss from giving up covenants in state H, and positively on the additional number of covenants in state L. As shown in the Appendix, if (11) and (13) hold, then the yield difference $h > 0$.

The rationale for the lower yield of defeasible bonds is twofold. First, upon option exercise in state H, the financier receives a cash payment of P^* and the bond becomes risk-free. If (11) and (13) hold, the option will be exercised in state H and, therefore, the *ex ante* risk is lower for the optimal defeasible bond. Second, the expected value to the financier of the additional covenants in state L exceeds the expected cost of giving up some covenants in state H net of the exercise price. Since this tradeoff increases the value of the defeasible bond to the financier, it also lowers the acceptable yield.

One question remains. If defeasible bonds pay a lower rate, would not all issuers prefer to include the covenant defeasance option?

Proposition 6 (defeasance exclusion): *If either (11) or (13) fails, then the financially constrained firm prefers to issue non-defeasible bonds.*

Proof: See Appendix.

If condition (11) fails, the firm cannot raise enough cash in state H to fund the exercise price P^*, so the covenant defeasance option will never be exercised. If condition (13) fails, the exercise price P^* exceeds the value of the firm's growth opportunities and the firm will not exercise the option. For a firm that will never exercise the defeasance option, it is suboptimal to issue the defeasible bond B^{**}, since B^{**} grants the financier more control in all states, $k_L^* > \widetilde{k}$. Instead, when either (11) or (13) fails, the financially constrained firm optimally issues a non-defeasible bond with $\tilde{k}$ covenants.

The results in Proposition 1 through Proposition 6 above are not limited to the binary setup of the model. If the firms' growth opportunities were continuously distributed over closed, bounded intervals, $[\underline{g}^i, \overline{g}^i]$ for all i, then it would still be the case that firm j, with $\overline{g}^j$ sufficiently small, would not benefit from the inclusion of the covenant defeasance option, because it would never exercise it.

3.4 Covenant defeasance and callability

An alternative way for the issuer to take control of covenant-restricted decisions is to call the bond. To investigate why issuers frequently include both callability and covenant defeasance, we now extend the model to incorporate callability.

Callable bonds can typically be called at face value, $I - A$, plus a premium. We denote by π_c the call premium, which may take a value from 0 for a standard callable bond to $M > 0$ for a make-whole callable bond. Recall that the firm has no cash at the intermediate date. To redeem the original bond, the firm must raise $I - A + \pi_c$ by issuing a new bond at the end of the call period.

As before, the firm can also remove covenants by exercising the defeasance option. In this case, the firm would raise $R_b + P^*$ by issuing a new bond in the interim state and placing the amount in an escrow account to the benefit of bondholders. Since the bond payment R_b compensates the financier *ex ante* for the default risk, covenant defeasance increases the value of the bond by making the future bond payment riskfree.

In practice, covenant defeasance takes effect right away, whereas calling and redeeming a bond typically takes 30 to 60 days. Recall that undertaking the growth options requires the firm to remove the covenants. However, these growth options may expire quickly and be gone if removal of the covenants takes too long. For example, if asset sales are restricted by covenants, the opportunity to sell a division may disappear if a potential buyer walks away before the bond is redeemed. Or, if a competitor makes an offer for an attractive target, the firm may not be able to react and launch its own bid unless covenants restricting acquisitions are removed promptly. Thus, if the firm's growth opportunities expire before the call period ends with some probability p, the issuer may prefer defeasing the covenants to calling the bond.

Denote by $\hat{R}_d^1$ and $\hat{R}_c^2$ the future payments on the new bonds funding covenant defeasance (d) and the call (c), respectively. The superscripts refer to the date of issue, reflecting the time delay with the call. Since bond redemption and covenant defeasance in practice removes all covenants, we let $k_H^* = 0$. The benefit from defeasing the covenants is hence $\sum_{k=1}^{k_L^*} \gamma_k$ and the cost is the difference between the payments on the new and the old bond, $\hat{R}_d^1 - R_b$. The issuer is then willing to defease the bond if

$$\sum_{k=1}^{k_L^*} \gamma_k \geq \hat{R}_d^1 - R_b. \tag{15}$$

When calling the bond, the growth opportunities may expire during the call wait period. The benefit from calling is therefore $(1-p)\sum_{k=1}^{k_L^*} \gamma_k$ and the cost is the difference in the payments on the new and the old bond, $\hat{R}_c^2 - R_b$. Hence, the issuer is willing to call the bond if

$$(1-p)\sum_{k=1}^{k_L^*} \gamma_k \geq \hat{R}_c^2 - R_b. \tag{16}$$

Proposition 7 focuses on the choice between defeasance and call for covenant removal.

Proposition 7 (defeasance vs. call): *Assume that (15) and (16) hold. Then the issuer would defease the covenants if*

$$p\sum_{k=1}^{k_L^*} \gamma_k \geq \hat{R}_d^1 - \hat{R}_c^2 \tag{17}$$

and call the bond otherwise.

Proof: See Appendix.

Proposition 7 states that if the covenant defeasance and the call both benefit the issuer *ex post*, so (15) and (16) hold, then the issuer prefers covenant defeasance to calling the bond when (i) the growth opportunities are likely to expire and/or (ii) the cost of defeasance is low relative to the call, and (17) holds. If (15) and (16) hold but (17) does not, then the issuer prefers to call the bond. This happens when growth opportunities are unlikely to expire and the cost of defeasance is high relative to the call. Hence, issuers with significant growth opportunities may benefit from adding both callability and covenant defeasance to their bonds. The issuers with the most binding financial constraints will include covenant defeasance only, since callability requires higher yield *ex ante*, while those with less binding constraints may add both.

Moreover, if defeasance is relatively costly, the firm may optimally defease the covenants right away and call the bond at the same time to redeem it later. This is another reason why issuers with significant growth opportunities may benefit from including both callability and covenant defeasance in their bonds. Let $\hat{R}^{1,2}_{d,c}$ be the payment for defeasing the covenants and calling the bond at the same time. If $\hat{R}^2_c < \hat{R}^1_d$, so defeasance is more costly than a call, then $\hat{R}^2_c < \hat{R}^{1,2}_{d,c} < \hat{R}^1_d$.

Proposition 8 (defeasance and call): *The issuer prefers to defease the covenants right away and call the bond at the same time to redeem it later if*

$$\hat{R}^2_c < \hat{R}^1_d \text{ and } p\sum_{k=1}^{k^*_L}\gamma_k \geq \hat{R}^{1,2}_{d,c} - \hat{R}^2_c. \tag{18}$$

Proof: See Appendix.

It follows from Proposition 8 that the issuer exercises the defeasance option and calls the bond at the same time to redeem later if its growth opportunities are likely to expire shortly and defeasance is costly relative to the call. Doing so enables the issuer to secure growth options right away and pay a lower exercise price. As discussed in Section 2, Tommy Hilfiger is a case in point.

There are two important and novel implications of Proposition 8 about bond yields. The first is derived from comparing *non-defeasible callable bonds* with *defeasible callable bonds.* Interestingly, there are states of the world in which the first bond would not be called but the second would. This would happen if (15) and (18) holds, but (16) does not. In this case, a defeasible callable bond is defeased and called at the same time. Since $\hat{R}^2_c < \hat{R}^1_d$, the defeasible callable bond pays the financier less than the non-defeasible callable bond, hence, our model predicts that defeasible callable bonds are charged a higher yield *ex ante* than non-defeasible standard callable bonds. Moreover, since the exercise price M in a make-whole bond is substantially higher than that in a standard callable bond—and closer to that of defeasance—inclusion of the defeasance option in a make-whole bond has a yield effect similar to that of a non-callable bond. Intuitively, because the refinancing risk in make-whole bonds is marginal, the dominant effect of defeasance inclusion is a reduction of the *ex-ante* default risk, lowering the required yield.

The second implication is derived from comparing *defeasible non-callable bonds* with *defeasible callable bonds.* If (15), (17) and (18) hold, but (16) does not, then the former is going to be defeased, while the latter will be defeased and called at the same time. Hence, upon exercise, the financier gets paid less for the latter. Furthermore, if (15) and (16) hold, but (17) does not, then the defeasible non-callable bond gets defeased, while the defeasible callable bond gets called. Again, upon exercise, the financier receives less for the latter. Hence, our model predicts that defeasible callable bonds require higher yield than defeasible non-callable bonds.

3.5 Testable implications

Our model offers several testable implications for covenant structures, issuer characteristics, and the pricing of the defeasance option in corporate bonds. The first set of predictions, **H1**, concerns the decision to include the covenant defeasance option in the bond. **H1-1** originates in Proposition 3. It states that bonds with more action-limiting covenants are more likely to be defeasible. **H1-2**, which follows from propositions 1, 4, and 6, describes the characteristics of firms that may benefit from covenant defeasance inclusion.

H1: *A corporate bond is more likely to include the covenant defeasance option:*

(1) the more action-limiting covenants it contains, especially covenants restricting the exercise of growth options, i.e., asset sales and debt issuance;

(2) if the issuer is financially constrained, has valuable growth opportunities in some states of the world, and faces a higher degree of uncertainty.

The next set of empirical predictions addresses the yield difference at issuance between defeasible and non-defeasible bonds.

H2: *The required yield on defeasible bonds relative to non-defeasible bonds is:*

(1) lower for non-callable bonds (reduced default risk)

(2) higher for standard callable bonds (increased refinancing risk)

(3) lower for pure make-whole bonds (reduced default risk)

The first yield prediction, **H2-1**, follows from propositions 5 and 6. Recall that, to defease a bond, the firm deposits in an escrow account sufficient cash and government securities to cover all remaining scheduled payments. Effectively, the issuer replaces a promised risky cash flow with an essentially risk-free cash flow. The removal of the default risk is valuable to the financier. Hence, the inclusion of the defeasance option, which may be exercised with some probability, reduces the required yield for non-callable bonds.

The next two yield predictions originate in Proposition 8. **H2-2** predicts that standard callable bonds have higher issue yield if they are also defeasible. The reason is that the covenant defeasance option increases the likelihood that the bond is called, and the financier requires higher yield to compensate for the greater refinancing risk. **H2-3** concerns pure make-whole bonds, which are callable at the make-whole price during their entire life. In a make-whole call, the issuer pays the present value of all future bond payments discounted at the risk-free rate plus a small spread. As long as the spread is sufficiently small, there is little refinancing risk in make-whole bonds.[14] So, although the defeasance option increases the likelihood that a make-whole bond is called, it may have only a marginal impact on the refinancing risk. Yet, it still increases the likelihood that the bond becomes risk-free. Therefore, adding the defeasance option to a pure make-whole bond should have a negative effect on the required yield. Our theory also predicts that, controlling for defeasance inclusion, a callable bond will have higher yield than a non-callable bond.

Our model does not generate a formal prediction for the yield associated with the defeasance option in mixed make-whole bonds, i.e., bonds that are callable at the make-whole price for an initial period and at a standard call price for the remainder of their life. However, since these bonds combine a make-whole and a standard call option, it is unclear whether the reduction in default risk or the increase in refinancing risk will dominate. Hence, we expect the inclusion of defeasibility in a mixed make-whole bond to have a yield impact in between that of a standard callable and a pure make-whole bond. In the next section, we test these empirical implications for a large sample of US corporate bonds.

[14] The average call spread of the make-whole bonds in our sample is 28 bps (median 25 bps).

4 Sample selection, empirical test strategy, and summary statistics

4.1 Sample selection

We obtain data on US corporate bond issues from FISD for the period 1983 to 2019. The sample construction is summarized in Table 1. We first retrieve all industrial and telecom issuers in the US from the Issuer Table in FISD. There are 7336 individual issuers, which we match to 49,690 bond issues from the Issues Table. We exclude bonds denominated in foreign currency, bonds of international issuers, government and municipal bonds, asset-backed bonds, private placements, convertible bonds, term notes, zero-coupon bonds, and PIK bonds. We also require a subsequent information flag and non-missing information on covenants and seniority.

This leaves 16,970 corporate bond issues, which we merge with information on the issuer from Compustat (matched by CUSIP), ratings from the FISD Ratings Table, the dispersion in analysts' forecasts from from Institutional Brokers Estimate System (I/B/E/S), and interest rates from the Federal Reserve Board. Further requiring non-missing information on defeasance generates a final sample of 5158 bond issues, which we use to test **H1** for the decision to include the defeasance option in the bond contract. These bonds represent 992 unique issuers and 2992 unique issuer-years. The median firm issues three bonds over the sample period, while the most active firm issues 66 bonds.[15]

Testing **H2**, however, requires data on the bond yield at issuance and a maturity-matched US Treasury bond.[16] This restriction reduces the sample to 3671 bond issues, which we use to test our second hypothesis for the pricing of the defeasance option.[17] While not tabulated, testing **H1** in the smaller sample of 3671 bond issues does not change our inferences below.

4.2 Empirical test strategy and variables

The first empirical prediction concerns the decision to include the defeasance option in the bond contract. We test **H1** by estimating the following cross-sectional regression model using a limited

[15] There are 92 unique lead investment banks in the sample, underwriting on average 54 bonds (median 4 bonds).

[16] For matching purposes, we restrict the sample to bonds with a maturity of $\leq$10 years, 20 years, or 30 years.

[17] The yield sample contains 684 unique issuers and 1324 unique issuer-years.

probability model:

$$Defeasance_i = \alpha + \beta_1 Covenants_i + \beta_2 Constraints_i + \beta_3 Growth_i + \beta_4 Uncertainty_i + \beta_5 \mathbf{X1_i} + \epsilon_i \quad (19)$$

All variables are defined in Table 2. The dependent variable $Defeasance$ takes the value of one if the bond includes the covenant defeasance option and zero otherwise. The explanatory variables are designed to test the different predictions of **H1-1** and **H1-2**. Starting with $Covenants$, it is the number of bond covenants defined either as the total number of covenants ($Number\ of\ Covenants$) or the number of action-limiting covenants of different types. The covenant data are from FISD and used to test **H1-1**, which predicts $\beta_1 > 0$.

The next three variables, *Constraints*, *Growth*, and $Uncertainty$, address **H1-2**. $Constraints$ are three measures intended to capture whether the firm is financially constrained. Following the extant literature, we use the Kaplan-Zingales (KZ) index of financial constraints as implemented by Lamont, Polk, and Saaá-Reguejo (2001), the Whited and Wu (WW) index of financial constraints from Whited and Wu (2006), and firm size (log of market capitalization) as in Hadlock and Pierce (2010). Moreover, *Growth* and $Uncertainty$ are proxies for future growth options and uncertainty, respectively, facing the firm. As Billet, King, and Mauer (2007), we use the market-to-book ratio and last year's sales growth as proxies for the firm's growth options. To estimate the uncertainty about the firm's future, we measure the cross-sectional standard deviation in analysts' earnings forecasts from I/B/E/S. Since the degree of financial constraints is decreasing in the KZ and WW indexes and firm size, **H1-2** predicts $\beta_2 < 0$, $\beta_3 > 0$, and $\beta_4 > 0$.

The vector **X1** contains bond, firm, and market characteristics that may otherwise affect the decision to include the defeasance option in the bond contract. We control for four bond characteristics from FISD: two dummies indicating that the bond includes a standard call option (*Standard Call*) and a make-whole call option (*MakeWhole*), the amount raised in the bond issue ($Issue\ size$), and *Rating*, defined as a categorical integer starting at one for AAA and increasing by one for each notch. The three firm characteristics in **X1** are from Compustat and the fiscal year-end prior to the issue. They are the ratio of property plant and equipment to total assets (*Fixed Assets Ratio*), the book leverage (*Leverage*), and the interest coverage ratio (*Interest Coverage Ratio*). **X1** further includes three controls for the market conditions at the time of issuance from the Federal Reserve Board: *Term Spread* (the yield difference between a maturity-matched zero-coupon US Treasury bond and the one-year US Treasury bill computed following Gurkaynak, Sack, and Wright (2006)), *Credit Spread* (the yield difference between Aaa and Baa rated corporate bonds with a maturity of twenty years or above), and *T-bill Yield* (the yield of a one-year US Treasury bill). In addition, all regressions contain dummies for the issue year, the bond maturity in years, and the issuer industry at the two-digit Standard Industry Classification (SIC) code level.

Our second hypothesis concerns the yield effect of including the defeasance option in the bond contract. We test **H2** by estimating the following ordinary least squares (OLS) regression:

$$\begin{aligned} Yield\ Spread_i &= \alpha + \beta_1 Defeasance_i + \beta_2 Defeasance_i * Standard\ Call_i \\ &\quad + \beta_3 Defeasance_i * \ MakeWhole_i + \beta_4 \mathbf{X2_i} + \epsilon_i \end{aligned} \tag{20}$$

The dependent variable *Yield Spread* is the bond's yield to maturity at issuance minus that of a maturity-matched zero-coupon T-bond.[18] The explanatory variables are the three dummies indicating that the bond includes options for defeasance ($Defeasance$), standard call (*Standard Call*), and make-whole call (*MakeWhole*).

Importantly, the regression model contains the interaction terms $Defeasance * Standard\ Call$ and $Defeasance * MakeWhole$. **H2-1** predicts that the yield of a non-callable bond is lower when it includes the defeasance option, hence, $\beta_1 < 0$. Moreover, **H2-2** implies that a standard callable bond has higher yield if it is defeasible, i.e., $\beta_2 > 0$. Finally, **H2-3** states that defeasance inclusion has a negative impact on the yield of pure make-whole bonds. To refine the tests, we split the make-whole bonds into *Pure MakeWhole* and *Mixed MakeWhole*. The prediction of **H2-3** applies specifically to the subset of pure make-whole bonds, so $\beta_{3-Pure} = 0$.[19] As discussed in Section 3.5, since mixed make-whole bonds are callable at the standard call price towards the end of their life, we expect defeasance inclusion to have a yield impact in between that of make-whole and standard callable bonds, i.e., $0 < \beta_{3-Mixed} < \beta_2$.

[18] We use the zero coupon rate because some bonds are issued below par and match on maturity (rather than duration) because the defeasance option can be exercised until maturity.

[19] The interaction variable $Defeasance * MakeWhole$ captures the difference in the yield effect of defeasance inclusion between non-callable and make-whole bonds, both of which are predicted to be negative.

The vector **X2** contains control variables that may otherwise affect the bond's issue yield from the extant literature.[20] This includes all the variables in **X1**: the four bond, three firm, and three market characteristics, as well as the issue year, maturity, and industry dummies. In addition, **X2** includes the total number of covenants (*Number of Covenants*) and the variables capturing *Constraints*, *Growth*, and *Uncertainty* from Eq (19). As discussed further in Section 5, we address the potential bias from the endogenous choice of including the defeasance option by estimating the yield regression in Eq. (20) for a propensity-score matched sample following Rosenbaum and Rubin (1983) and performing the self-selection correction procedure suggested by Lee (1978) and others.

4.3 Sample description

Table 3 provides summary statistics for the sample of 5158 corporate bond issues. As shown in Panel A, 75% of the sample bonds are defeasible, whereas 82% include some kind of a call option. While not tabulated, 85% of the defeasible bonds and 74% of the non-defeasible bonds are callable. Moreover, 77% of the callable bonds and 62% of the non-callable bonds are defeasible. So, corporate bonds often include both the defeasance option and a call option, consistent with our theory.

As to the type of call options, ten percent of the sample bonds include a standard call with a hard-call protection period, i.e., an initial period during which the bond is non-callable. We label these bonds standard callable bonds. Another 42% of the sample bonds include a standard call option but has an initial period during which the issuer can make a soft call at the make-whole premium. We refer to these bonds, which combine a standard call and a make-whole call, as mixed make-whole bonds. In addition, 30% of the sample bonds are callable only at the make-whole price, referred to as pure make-whole bonds. So, when we use the broader term make-whole bonds, it includes both of the latter type of bonds.

As shown in Figure 2, the annual frequency of bonds that include the defeasance option is relatively stable over the sample period. However, standard callable bonds are most common in the first half of the sample period, while there is a large increase in the fraction of bonds that combine standard callability with a make-whole call in the second half of the sample period. Also interesting, the fraction

[20] See, e.g., Nash, Netter, and Poulsen (2003), Reisel (2014), and Billet, King, and Mauer (2007).

of pure make-whole bonds increase in the 1990s to peak in the year XXX, and then to decline as the mixed make-whole bonds become increasingly common.

Panel B of Table 3 reports the frequency of different types of covenants in the sample bonds. The average bond has 5.5 covenants, most of which are action-limiting. We group the individual covenants according to the role of the actions they control. On average 1.0 covenants restrict debt issuance, 1.7 limit asset sales, 1.4 pertain to M&A, 0.4 regulate payouts, and 0.9 pertain to default, while 0.2 covenants address financial ratios. The median bond has five action-limiting covenants—two asset sales restrictions and one covenant each concerning debt issuance, M&A, and default—but no financial covenants.[21]

Table 4 presents additional details on the individual covenants and their classification into different types. The five covenants in Panel A all restrict the issuance of new debt. The two most common debt issuance restrictions are negative pledge (77% of the bonds), requiring the current issue to be pari passu to any new debt issue, and indebtedness (20%), restricting the issuer from incurring additional debt. Panel B lists three covenants related to the sale of assets: restrictions on the issuers ability to sell assets or use the proceeds from the sale of assets (90%), restrictions on sale-leaseback transactions (65%), and requirements to use the proceeds from asset sales to redeem the bond (13%). In Panel C, there are two covenants restricting the firm's M&A activities, preventing the firm from consolidating or merging with another firm (90%) and allowing the bondholder to put the bond back to the issuer if there is a change of control (47%).

Panel D of Table 4 contains three covenants limiting the issuer's ability to pay out funds: restricting payouts other than dividends to shareholders (15%), certain business dealings with subsidiaries (15%), and dividends (5%). The three covenants in Panel E concern default, allowing acceleration (66%) or default (19%) of the issue if another debt defaults, and giving bondholders the legal right to sell mortgaged property to satisfy unpaid obligations (5%). Finally, as shown in Panel F, only a small fraction of bonds contain financial covenants. The only financial covenant of any significant frequency requires the issuer to have a minimum ratio of earnings available for fixed charges (20%). The table

[21] This contrasts to bank loans, which generally contain covenants regulating financial ratios (Demiroglu and James, 2010; Nini, Smith, and Sufi, 2009) as well as action-limiting covenants (Ivashina and Vallee, 2020). Bank loans, however, do not include the defeasance option, likely because they often allow for penalty-free prepayment (Eckbo, Su, and Thorburn, 2022) and are easier to renegotiate (Roberts and Sufi, 2009).

also reports the average number of covenants for the subsamples of 1305 bonds that are non-defeasible (column 2) and 3853 bonds that are defeasible (column 3), as well as the difference between the two subsamples (column 4). As shown, defeasible bonds generally include more action-limiting covenants than non-defeasible bonds. The exception worth noting are cross-default and liens covenants (both in Panel E), which are somewhat less common in defeasible bonds (18% vs. 22% and 4% vs. 8%, respectively).

Returning to Table 3, Panel C reports that the average sample bond is issued at a yield spread of 153 bps (median 129 bps) to a maturity-matched government bond. The average bond issue has a size of $553 million (median $400), a *Rating* score of 9, corresponding to a BBB+ rating, and a maturity of 12 years. Panel D lists the firm characteristics in **X1** and **X2**. The average issuer has a market capitalization of $16.5 billion (median $5.1 billion), a market-to-book ratio of 1.88 (median 1.60), and 13% (median 7%) sales growth from the previous year.[22] The last panel of Table 3 reports the market conditions at the time of the bond issue. The market-wide credit spread between twenty-year Aaa and Baa rated bonds averages 94 bps (median 86 bps), while the term spread (the yield difference between the maturity-matched T-bond and the one-year T-bill) averages 136 bps (median 133 bps). The one-year T-bill yield averages 240 bps (median 214 bps), ranging from a high of 776 bps to a low of 9 bps, reflecting the decline in the risk-free rate over the sample period.

5 Empirical results

5.1 Determinants of defeasance inclusion

We first examine the determinants of the decision to include the covenant defeasance option in the bond contract. Table 5 shows the coefficient estimates from OLS regressions of Eq. (19). The coefficient estimates from probit estimations of Eq. (19), shown in Appendix Table 2, yield similar inferences. Standard errors are clustered by firm, following Petersen (2008). Starting with the odd-numbered columns, the variable *Number of Covenants* generates a positive and highly significant coefficient. That is, the more bond covenants, the more likely is the bond to include the covenant defeasance option, consistent with **H1-1**. For the average bond, the addition of one covenant increases the likelihood of

[22]We winsorize the sales growth of one outlier firm.

defeasance inclusion by 3.5 percentage points.[23] In the even-numbered columns, *Number of Covenants* is replaced with the number of covenants of different types, as detailed in Table 4. As shown, two of the five types of action-limiting covenants receive positive and significant coefficients. Specifically, the likelihood of defeasance inclusion is higher the more covenants restricting debt issuance and asset sales, also as predicted by **H1-1**.

Recall from Result 1 that bonds issued by financially constrained firms include more covenants. Hence, the positive coefficient for the number of covenants is consistent with financially constrained firms being more likely to include the defeasance option in their bonds. The regression model includes three additional measures for financial constraints: *KZ Index* (columns 3-4), *WW Index* (columns 5-6), and $MarketCap$ (columns 1-6). All three variables generate negative and highly significant coefficients, suggesting that firms with greater financial constraints are more likely to issue defeasible bonds, consistent with **H1-2**. Moreover, defeasance inclusion is more common for firms facing more uncertainty about their future earnings, also as predicted by **H1-2**. However, the evidence of a relationship between the issuer's growth options and inclusion of the defeasance options is marginal.[24]

Turning to the control variables in **X1**, the likelihood of defeasance inclusion is higher for make-whole bonds, decreasing in leverage, and increasing in *Credit Spread*. Since the credit spread is countercyclical and associated with economy-wide uncertainty (Collin-Dufresne, Goldstein, and Martin, 2001; Huang and Huang, 2012), it is possible that bonds issued in periods with greater uncertainty about the future are more likely to be defeasible. Another possible explanation is that the defeasance option has more value when there is a greater chance that the bond will subsequently be refinanced at more attractive spreads (Xu, 2018).

Since the defeasance option is rarely exercised, one may wonder if underwriters include this option without making a deliberate decision. To address this issue, Figure 3 plots the fraction of bonds that include the defeasance option for the thirty largest underwriters, all with a minimum of ten bond issues. The underwriters are sorter from left to right on the fraction of their bonds that are defeasable. On average, these underwriters include the defeasance option in 74% of the bonds they issue.

[23] To put this into perspective, the average bond with 5.5 covenants has a 19 percentage point higher likelihood of defeasance inclusion than a hypothetical bond with zero covenants.

[24] Because *Sales Growth*, *KZ Index*, and *WW Index* are highly correlated, the regression model includes these variables one at the time.

If the inclusion of defeasibility is largely automatic, we should observe corner solutions where some underwriters always include the defeasance option and others do not. However, as shown in the figure, the distribution of defeasance inclusion is relatively evenly spread across the underwriters ranging from 62% of the bonds in the bottom decile of underwriters to 90% of the bonds in the top decile. This suggests that underwriters selectively include the defeasance option in corporate bonds, supporting the notion of a deliberate choice.

Overall, our evidence suggests that corporate bonds are more likely to include the defeasance option if the issuer is financially constrained and the bond has many covenants that may restrict the firm's ability to act on uncertain future opportunities, supporting the predictions of **H1**.

5.2 Determinants of the bond yield spread

We next test **H2** by examining the determinants of the bond's issuance yield. Table 7 reports the coefficient estimates from OLS regressions of Eq. (20), where the dependent variable is the yield spread between the bond and a maturity-matched zero-coupon T-bond. As before, we cluster the standard errors at the firm level. Notice first that the coefficient for $Defeasance$ is negative and significant at the 5% level, so $\beta_1 < 0$. In other words, investors require lower yield spread for a non-callable bond that includes the defeasance option, as predicted by **H2-1**. Intuitively, the defeasance of a non-callable bond renders the remaining payments essentially riskfree, lowering the required yield. The average yield-spread reduction from defeasance inclusion in a non-callable bond is about 14 bps.

In contrast, the coefficients for $Standard\ Call$ and $Defeasance * Standard\ Call$ are positive and significant. Consistent with our model, controlling for the defeasance option, callable bonds require higher yield spread than non-callable bonds. Moreover, the positive coefficient for the interaction term, $\beta_2 > 0$, shows that the inclusion of the defeasance option in a standard callable bond increases the required yield spread further, consistent with **H2-2**. In our model, the defeasance option increases the likelihood that the bond is called and, therefore, the refinancing risk; hence, the higher required yield. In column (1), standard callability adds on average 40 bps to the yield spread of a non-callable bond, and the inclusion of defeasibility in a standard callable bond adds another 44 bps.

The first three columns of Table 7 do not distinguish between different types of make-whole bonds.

Here, the coefficient for $Make\ Whole$ is negative and highly significant, while the interaction term $Defeasance * Make\ Whole$ is insignificant. That is, in contrast to extant studies, we find that make-whole bonds are issued at lower average yield spread than non-callable bonds.[25] Moreover, the inclusion of the defeasance option in a make-whole bond is not significantly different from the impact on the yield spread of a non-callable bond, as predicted. Intuitively, since investors' refinancing risk in a make-whole bond is marginal, the dominant effect of defeasance exercise is a reduced default risk—just like in non-callable bonds—lowering the required yield.

To test **H2-3**, the last three columns split the make-whole bonds into pure and mixed, where the latter initially only permits a standard call. On average, pure make-whole bonds are issued at lower (on average 24 bps) yields than non-callable bonds, whereas mixed make-whole bonds are issued at similar spreads as non-callable bonds. Turning to the interaction terms, adding defeasibility to a pure make-whole bond has a similar effect as adding it to a non-callable bond, so $\beta_{3-Pure} = 0$ consistent with **H2-3**. However, the inclusion of the defeasance option increases the required yield spread of the mixed make-whole bonds. While the point estimate of the yield spread associated with defeasibility inclusion is lower for mixed make-whole bonds than for standard callable bonds (22 vs 46 bps in column 4), this difference is not significantly different from zero. Our evidence suggests that the standard call included in the mixed make-whole bonds makes them a hybrid between pure make-whole bonds and standard callable bonds in terms of the cost of defeasance inclusion, reflected in the issuance yield.

Several of the control variables are significant and consistent with prior studies. The offering yield is higher for financially constrained firms, as evidenced by *KZ Index* and *WW Index*, and for highly leveraged issuers. The yield spread is further increasing in the market-wide credit spread and decreasing in the issuer's market-to-book ratio and market capitalization, and in the term spread. *Rating* is positive and significant as investors generally require lower yield for bonds with higher credit rating (low value on *Rating*). Also, contrary to Miller and Reisel (2012) and Reisel (2014), the bond yield is increasing in the number of bond covenants. It is possible that the number of covenants is correlated with other characteristics that drive bond yields, so the positive sign reflects that riskier bonds tend to have more covenants and higher yield, rather than the marginal impact of the covenants themselves.

[25] See, e.g., Mann and Powers (2003) and Becker, Campello, Thell, and Yan (2018) for the yield impact of the make-whole provision.

Overall, the evidence in Table 7 supports the model's predictions for bond yields summarized in **H2**. Specifically, to include the defeasance option, investors on average require lower yield for non-callable bonds (**H2-1**) and pure make-whole bonds (**H2-3**), whereas defeasance inclusion increases the required yield for standard callable bonds (**H2-2**).

5.3 Estimating the yield spread for a matched sample of bonds

The issuer's decision to include the covenant defeasance option is not random. If the characteristics determining the issuer's choice to include defeasance also affect the yield spread, the coefficient estimates in Table 7 may be biased. In this section, we address this potential endogeneity with the propensity score matching procedure of Rosenbaum and Rubin (1983). The three-step procedure matches the defeasible (treated) bonds with otherwise similar non-defeasible (control) bonds and compares the yield spreads of the matching pairs.[26] First, we estimate the coefficients in Eq. (19) for the determinants of defeasance inclusion using a probit regression and compute the propensity scores. Second, for each defeasible bond, we find the closest match among the non-defeasible bonds (one-to-one matching). Third, we compute the yield spread difference between these two bonds.

Because there are three times as many defeasible bonds as non-defeasible bonds in the sample, we allow a non-defeasible bond to be used multiple times. We implement nearest-neighbor matching with replacement and either use a caliper of 0.15 or enforce common support.[27] Enforcing common support, however, limits the caliper to 0.15 or less, so the two restrictions generate identical results. Hence, we only report the results for common support. Common support eliminates all defeasible bonds with a propensity score exceeding the maximum score of the non-defeasible bonds and all non-defeasible bonds with a propensity score lower than the minimum score of the defeasible bonds. This reduces the sample size to 3,543 bonds: 2,549 defeasible bonds and 994 unique non-defeasible bonds. We use Stata's *teffects psmatch* command to implement the standard errors of Abadie and Imbens (2016).

Panel B of Table 9 reports the marginal effects of the key explanatory variables in the probit regressions. The remaining variables in the vector **X1** are suppressed for expositional purposes. Column (1)

[26] The technique is described in detail in Angrist and Pischke (2009) and used by, e.g., Drucker and Puri (2005), Lemmon and Roberts (2010), and Arentsen, Mauer, Rosenlund, Zhang, and Zhao (2015).

[27] A caliper below 0.15 requires standard errors to be independently and identically (iid) distributed, which is unlikely in our sample as many firms issue more than one bond.

includes an indicator for make-whole bonds, while column (2) identifies pure and mixed make-whole bonds separately. We use these probit regressions to compute the propensity scores and select the matching bonds. The matching diagnostics are presented in Table **??**. The variance ratio indicates the difference in mean and median between the treated and control firms before and after the match. As shown, the propensity score matching reduces the variance ratio with few exceptions.

Recall that **H2** predicts a negative yield effect of defeasance inclusion for non-callable bonds and pure make-whole bonds, and a positive effect for standard callable bonds. Since only 10% of the sample bonds are standard callable, we expect the negative effect of defeasance inclusion to dominate in the pooled sample. This inference holds in the data. Panel A of Table 9 lists the average yield-spread difference between defeasible bonds and matched non-defeasible bonds. As shown, the average treatment effect is –17 bps and significant (column 1). Hence, the yield impact of defeasance inclusion uncovered through propensity score matching is comparable to that reported in the OLS regressions in Table 5.

5.4 Addressing self-selection with two-stage estimation

We further address the potential endogeneity of defeasance inclusion through the two-stage estimation procedure proposed by Lee (1978) and used for bonds by Goyal (2005), Reisel (2014), and Bradley and Roberts (2015). The procedure is similar to a Heckman (1979) procedure, where the first step estimates the probability of defeasance inclusion and the second step is an OLS estimation of the yield spread that includes the inverse Mills ratio from the first step. If the coefficient for the inverse Mill's ratio is significant, the coefficients in the standard OLS estimation may be biased. We use the same probit model for defeasance inclusion as that used in the matching procedure in Table 9.

The OLS estimation is run separately for defeasible and non-defeasible bonds, and select coefficient estimates are listed in Panel B of Table 10. The first two columns include an indicator for make-whole bonds, whereas the last two columns use separate indicators for pure and mixed make-whole bonds. The explanatory variables are the same as before, although most of the coefficients are suppressed for expositional purposes. As before, the inclusion of standard callability increases the issuance yield, while defeasible make-whole bonds require lower yields. Importantly, the coefficient for the inverse

Mills ratio is insignificant in all models. This lack of significance can be interpreted as evidence against a selection bias (Wooldridge, 2002), supporting the validity of the standard OLS regressions reported in Table 7 above.

Using the coefficient estimates in Panel B, we predict two yields for each sample bond: one yield if it were defeasible and one if it were not. That is, each bond, whether defeasible or not, has a predicted yield and a predicted counterfactual yield. Panel A of Table 10 presents the average model-based predicted yield for non-defeasible and defeasible bonds. As in the matching procedure, since the majority of sample bonds are non-callable or pure make-whole, we expect the negative effect of defeasance inclusion to dominate the pooled sample. As reported in Panel A, the difference in the average yield is –5 bps and significant at the 5% level using a t-test.

For robustness, Panel C presents select coefficients from the initial probit regression, adding the predicted yield differential for each bond as explanatory variable. This last step addresses concerns that the implied yield differential of defeasance inclusion affects the inclusion decision itself. However, as shown, the coefficient for the predicted yield differential is insignificant, hence, not supporting reverse causality. Overall, the evidence in Table 10 indicates that the coefficient estimates in the standard OLS regressions presented in Table 7 are unbiased.

6 Conclusion

This paper is the first to theoretically and empirically analyze the role of the covenant defeasance option in corporate bonds. Defeasance exercise removes all covenants by depositing sufficient cash and risk-free securities to service all future bond payments in an escrow account. The option allows financially constrained issuers to accept unconditional action-limiting covenants, which increase their pledgeable income *ex ante*, by giving them the right to remove these covenants in states when doing so is harmless to bondholders. Hence, although dispersely held corporate bonds are virtually impossible to renegotiate, issuers get the flexibility to realize valuable growth opportunities *ex post* by exercising the defeasance option.

Our analysis offers novel insights about the design of corporate bonds. It explains what type of firms that include the covenant defeasance option and how defeasance inclusion affects the issuance yield. Moreover, it addresses the complementarity of defeasance and callability. While firms can also remove covenants by calling the bonds, defeasance can be effectuated immediately and, hence, complements callability when urgency is of essence.

Our model provides and our empirical analysis supports several important insights. In particular, financially constrained firms with high degree of uncertainty and bonds with many action-limiting covenants are more likely to include the defeasance option. Furthermore, non-callable bonds require lower yield for including the defeasance option, while callable bonds require higher yield. Investors are willing to accept lower yield for the former, since covenant defeasance exercise makes a non-callable bond essentially risk-free, which benefits investors. In contrast, investors demand higher yield for the latter because the covenant defeasance option raises the likelihood that a callable bond is called, increasing investors' refinancing risk. Hence, our study not only highlights the defeasance option, but also improves our understanding of the call option often included in bond contracts.

Appendix

Proof of Optimality of the Financial Contract in Section 3.2: The optimal contract in Section 3.2 maximizes the firm's payoff subject to (4) and (6). To increase pledgeable income the firm needs to give up decisions, k such that $1 > \frac{\tau_k R}{\gamma_k} \geq 1 - (\lambda - 1)\frac{\tau_k R_b}{\gamma_k}$), i.e. decisions that would be efficient to keep in the firm's control. Hence, the optimal contract involves some inefficient control allocations. To see this, consider first the case where d_k can take any values on the interval $[0, 1]$. Then, forming the Lagrange function (where α and λ are the multipliers of the (4), and (6) constraints, respectively) and taking its partial derivatives yields

$$\frac{\partial L}{\partial R_b} = (\lambda - 1)\left(\sigma_H^H \nu_H + (1 - \sigma_H^H)\nu_L + \sum_{k=1}^{K} \tau_k d_k\right) - \alpha \tag{21}$$

$$\frac{\partial L}{\partial d_k} = \tau_k R - \gamma_k + (\lambda - 1)\tau_k R_b \tag{22}$$

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

$$\left(\sigma_H^H \nu_H + \left(1 - \sigma_H^H\right)\nu_L + \sum_{k=1}^{k^*} \tau_k d_k\right)\left(R - \frac{Q}{\Delta\sigma\Delta\nu}\right) < I - A \tag{23}$$

as implied by (2) which is not enough to break even. If, however, $\alpha > 0$, then $\lambda > 1$ and a decision k will be controlled by the financier if and only if:

$$\frac{\tau_k R}{\gamma_k} \geq 1 - (\lambda - 1)\frac{\tau_k R_b}{\gamma_k}. \tag{24}$$

This indicates that the optimal contract involves some inefficient control allocations. In particular, the firm can increase pledgeable income, if it gives up control of those activities for which $1 > \frac{\tau_k R}{\gamma_k} \geq 1 - (\lambda - 1)\frac{\tau_k R_b}{\gamma_k}$. This result also holds when d_k can take values of $\{0, 1\}$ only and the derivatives are replaced by differentials. ■

Proof of Part 1 of Lemma 1: First, we prove that it is optimal to assign the financier control over k_H^* actions in state H. Consider first the case, where d_k^H and d_k^L is defined on the interval [0,1], representing probabilistic allocation of control. The partial derivatives of the Lagrangian function for this case are:

$$\frac{\partial L}{\partial R_b} = (\lambda-1)\left(\sigma_H^H\left(\nu_H+\sum_{k=1}^K\tau_k d_k^H\right)+(1-\sigma_H^H)\left(\nu_L+\sum_{k=1}^K\tau_k d_k^L\right)\right)- \tag{25}$$

$$\alpha\left(\Delta\sigma\Delta\nu+\Delta\sigma\sum_{k=1}^K\tau_k(d_k^H-d_k^L)\right) \tag{26}$$

$$\frac{\partial L}{\partial d_k^H} = \tau_k R-\gamma_k+(\lambda-1)\tau_k R_b+\alpha\frac{\Delta\sigma}{\sigma_H^H}\left(\tau_k\left(R-R_b\right)-\gamma_k\right) \tag{27}$$

$$\frac{\partial L}{\partial d_k^L} = \tau_k R-\gamma_k+(\lambda-1)\tau_k R_b-\alpha\frac{\Delta\sigma}{1-\sigma_H^H}\left(\tau_k\left(R-R_b\right)-\gamma_k\right) \tag{28}$$

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

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:

$$\frac{\partial L}{\partial R_b} = (\lambda-1)p_H-\alpha\Delta p \tag{29}$$

$$\frac{\partial L}{\partial d_k^H} = (\tau_k R-\gamma_k)\left(1+\alpha\frac{\Delta\sigma}{\sigma_{HH}}\right)+(\lambda-1)\left(1-\frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_H^H}\right)\tau_k R_b \tag{30}$$

$$\frac{\partial L}{\partial d_k^L} = (\tau_k R-\gamma_k)\left(1-\alpha\frac{\Delta\sigma}{1-\sigma_{HH}}\right)+(\lambda-1)\left(1+\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_H^H}\right)\tau_k R_b \tag{31}$$

The equation implies that $\alpha=(\lambda-1)\frac{p_H}{\Delta p}$. As before, $\alpha=0$ is impossible and $\lambda>1$. Substituting for α in the other partial derivatives yields

$$\frac{\partial L}{\partial d_k^H} = \tau_k R-\gamma_k+(\lambda-1)\left[\tau_k R_b+\frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_H^H}\left(\tau_k\left(R-R_b\right)-\gamma_k\right)\right] \tag{32}$$

$$\frac{\partial L}{\partial d_k^L} = \tau_k R-\gamma_k+(\lambda-1)\left[\tau_k R_b-\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_H^H}\left(\tau_k\left(R-R_b\right)-\gamma_k\right)\right] \tag{33}$$

We will now show that $1<\frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_H^H}$. Indeed, this is equivalent to:

$$\begin{aligned}\Delta p\sigma_H^H &< p_H\Delta\sigma\\ &\Leftrightarrow p_H\sigma_L^H<p_L\sigma_H^H\end{aligned}$$

which is equivalent to:

$$\left(q_L+\sigma_H^H(q_H-q_L)\right)\sigma_L^H<\left(q_L+\sigma_L^H(q_H-q_L)\right)\sigma_H^H \tag{34}$$

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

$$(\tau_k R - \gamma_k)\left(1 + (\lambda - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_H^H}\right) + (\lambda - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_H^H}\right)\tau_k R_b \geq 0 \tag{35}$$

$$\Leftrightarrow \frac{\tau_k R}{\gamma_k} \geq 1 - (\lambda - 1)\frac{1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_H^H}}{\left(1 + (\lambda - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{\sigma_H^H}\right)}\frac{\tau_k R_b}{\gamma_k}, \tag{36}$$

there will be some decisions for which $\frac{\tau_k R}{\gamma_k} \geq 1$ and $\frac{\partial L}{\partial d_k^H} \leq 0$. This result also holds when d_k can take values of $\{0, 1\}$ only, and the derivatives are replaced by differentials. ■

Proof of Part 2 of Lemma 1: First, we prove that it is optimal to assign the financier control over k_L^* actions in state L. Consider first the case, where d_k^H and d_k^L is defined on the interval $[0, 1]$, representing probabilistic allocation of control. Then,

$$\frac{\partial L}{\partial d_k^L} = \tau_k R - \gamma_k + (\lambda - 1)\left[\tau_k R_b - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_H^H}\left(\tau_k\left(R - R_b\right) - \gamma_k\right)\right] \tag{37}$$

This can be rewritten as

$$\frac{\partial L}{\partial d_k^L} = (\tau_k R - \gamma_k)\left(1 - (\lambda - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_H^H}\right) + (\lambda - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_H^H}\right)\tau_k R_b \tag{38}$$

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

$$(\tau_k R - \gamma_k)\left(1 - (\lambda - 1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_H^H}\right) \geq -(\lambda - 1)\left(1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_H^H}\right)\tau_k R_b \tag{39}$$

Notice first that

$$1 - \frac{p_H}{\Delta p}\frac{\Delta\sigma}{1 - \sigma_H^H} \geq 0 \Leftrightarrow \tag{40}$$

$$(p_H - p_L)(1 - \sigma_H^H) - p_H\Delta\sigma \geq 0 \Leftrightarrow \tag{41}$$

$$\Delta\sigma\Delta q(1 - \sigma_H^H) - p_H\Delta\sigma \geq 0 \Leftrightarrow \tag{42}$$

$$\Delta q(1 - \sigma_H^H) - (q_L + \sigma_H^H\Delta q) \geq 0 \Leftrightarrow \tag{43}$$

$$q_H - q_L - \sigma_H^H q_H + q_L\sigma_H^H - q_L - \sigma_H^H q_H + \sigma_H^H q_L \geq 0 \Leftrightarrow \tag{44}$$

$$q_H \geq 0, \tag{45}$$

which is true. There are two cases to consider.

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

$$\frac{\tau_k R}{\gamma_k} \geq 1 - \frac{(\lambda-1)\left(1-\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_H^H}\right)\tau_k R_b}{\left(1-(\lambda-1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_H^H}\right)\gamma_k} \tag{46}$$

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

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

$$\frac{\tau_k R}{\gamma_k} \leq 1 - \frac{(\lambda-1)\left(1-\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_H^H}\right)\tau_k R_b}{\left((\lambda-1)\frac{p_H}{\Delta p}\frac{\Delta\sigma}{1-\sigma_H^H}-1\right)\gamma_k} \tag{47}$$

and then control would be granted over decisions from $\widehat{k}$ to K, $\widehat{k} > k^*$. Notice though that $\forall k$,

$$\sigma_H^H \frac{\partial L}{\partial d_k^H} + (1-\sigma_H^H)\frac{\partial L}{\partial d_k^L} = \tau_k R - \gamma_k + (\lambda-1)\tau_k R_b \tag{48}$$

Therefore,

$$\sigma_H^H \frac{\partial L}{\partial d_k^H} + (1-\sigma_H^H)\frac{\partial L}{\partial d_k^L} \geq 0 \Leftrightarrow \tag{49}$$

$$\frac{\tau_k R}{\gamma_k} \geq 1 - \frac{(\lambda-1)\tau_k R_b}{\gamma_k} \tag{50}$$

Take a decision k for which $\frac{\tau_k R}{\gamma_k} \geq 1$. Then, it cannot be the case that 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 shown that $k_H^* \leq k^*$. Moreover, if case 2 obtains, then for decisions k^* through $\widehat{k}$, $d_k^L = 0$. Hence, for those decisions both $d_k^H = 0$ and $d_k^L = 0$ hold, which is a contradiction.

The results also hold if $d_k = 0$ or 1 only, and the derivatives are replaced by differentials. ■

Proof of Proposition 3: Since the optimal non-defeasible bond grants the financier control over decisions 1 through $\widetilde{k}$, it follows from Lemma 1 that only defeasible bonds would optimally grant investors control over decisions 1 through $k_L^* > \widetilde{k}$. Hence, the optimal defeasible bond has more covenants that the optimal non-defeasible bond. Consequently, bonds with more covenants are more likely to be defeasible. ■

Proof of Proposition 4: Assume that $(\nu_H + \sum_{k=1}^{k_H^*} \tau_k)(R - R_b) > \sum_{k=k_H^*}^{k_L^*} \tau_k R_b$. Let $\Delta\nu = \nu_H - \nu_L$. The issuer's expected payoff in state H if the option is exercised equals the gross return of the project, minus the payment to the lender, minus the price of the exercise.

$$(\nu_H + \sum_{k=1}^{k_H^*} \tau_k)(R - R_b) - \sum_{k=1}^{k_H^*} \gamma_k - (\nu_L + \sum_{k=1}^{k_H^*} \tau_k)(R - R_b) - \epsilon = \Delta\nu(R - R_b) - \epsilon - \sum_{k=1}^{k_H^*} \gamma_k \tag{51}$$

If the issuer does not exercise the option in state H, then it would receive

$$(\nu_H + \sum_{k=1}^{k_L^*} \tau_k)(R - R_b) - \sum_{k=1}^{k_L^*} \gamma_k \tag{52}$$

The issuer prefers to exercise the option if

$$\Delta\nu(R - R_b) - \sum_{k=1}^{k_H^*} \gamma_k - \epsilon \geq (\nu_H + \sum_{k=1}^{k_L^*} \tau_k)(R - R_b) - \sum_{k=1}^{k_L^*} \gamma_k, \tag{53}$$

or

$$\sum_{k_H^*}^{k_L^*} \gamma_k \geq (\nu_L + \sum_{k=1}^{k_L^*} \tau_k)(R - R_b) + \epsilon \tag{54}$$

The same logic applies for the case when $\sum_{k=k_H^*}^{k_L^*} \tau_k R_b \geq (\nu_H \sum_{k=1}^{k_H^*} \tau_k)(R - R_b)$.. ■

Proof of Proposition 5: Compare the IR conditions for B^* and B^{**}. Assume that R_b^* and R_b^{**} are equal; $R_b^* = R_b^{**} = R_b$. The IR condition for B^*, and B^{**}, respectively:

$$\sigma_H^H \left(\nu_H + \sum_{k=1}^{\widetilde{k}} \tau_k \right) R_b + (1 - \sigma_H^H) \left(\nu_L + \sum_{k=1}^{\widetilde{k}} \tau_k \right) R_b \geq I - A; \tag{55}$$

$$\sigma_H^H \left(\nu_H + \sum_{k=1}^{k_H^*} \tau_k \right) R_b + \sigma_H^H P^* + (1 - \sigma_H^H) \left(\nu_L + \sum_{k=1}^{k_L^*} \tau_k \right) R_b \geq I - A. \tag{56}$$

Recall from Proposition 2 that $P^* \geq \sum_{k=k_H^*}^{k_L^*} \tau_k R_b$. Therefore, the sum of the first two terms on the LHS in (56) exceeds the first term on the LHS of (55). The difference between the third term on the LHS of (56) from the second on the LHS of (55), $\sum_{\tilde{k}}^{k_L^*} \tau_k R_b$, is positive, since $k_L^* > \tilde{k}$. Hence, if R_b were the same for both, then the LHS of (56) would exceed the LHS of (55). Since optimality (efficiency) requires that the financier's IR constraint be binding, B^{**} must promise a lower yield than B^*, that is, $R_b^* \geq R_b^{**}$.

Next we derive the yield differential. Assuming that the financier breaks even on both bonds, and setting the LHSs of the IR conditions equal, we get

$$\sigma_H^H(\nu_H + \sum_{k=1}^{\tilde{k}} \tau_k) R_{b*} + (1-\sigma_H^H)(\nu_L + \sum_{k=1}^{\tilde{k}} \tau_k) R_{b*} =$$

$$\sigma_H^H(\nu_H + \sum_{k=1}^{k_H^*} \tau_k) R_{b**} + \sigma_H^H P^* + (1-\sigma_H^H)(\nu_L + \sum_{k=1}^{k_L^*} \tau_k) R_{b**},$$

or

$$\sigma_H^H(\nu_H + \sum_{k=1}^{\tilde{k}} \tau_k)(R_{b*} - R_{b**}) + (1-\sigma_H^H)(\nu_L + \sum_{k=1}^{\tilde{k}} \tau_k)(R_{b*} - R_{b**}) =$$

$$-\sigma_H^H \sum_{k=k_H^*}^{\tilde{k}} \tau_k R_{b**} + \sigma_H^H P^* + (1-\sigma_H^H) \sum_{k=\tilde{k}}^{k_L^*} \tau_k R_{b**}$$

For $h = R_{b*} - R_{b**}$ and $\overline{\nu} = \sigma_H^H \nu_H + (1-\sigma_H^H)\nu_L$, we get

$$h(\overline{\nu} + \sum_{k=1}^{\tilde{k}} \tau_k) = -\sigma_H^H \sum_{k=k_H^*}^{\tilde{k}} \tau_k R_{b**} + \sigma_H^H P^* + (1-\sigma_H^H) \sum_{k=\tilde{k}}^{k_L^*} R_{b**}$$

Solving for h, the yield differential

$$h = \frac{\sigma_H^H P^* - \sigma_H^H \sum_{k=k_H^*}^{\tilde{k}} \tau_k R_{b**} + (1-\sigma_H^H) \sum_{k=\tilde{k}}^{k_{L*}} \tau_k R_{b**}}{\overline{\nu} + \sum_{k=1}^{\tilde{k}} \tau_k}, \text{as claimed. } \blacksquare$$

Proof of Proposition 6: Assume that either (11) or (13) is violated. Then, compare the IR conditions for B^* and B^{**} as in the proof of Proposition 5 assuming that R_b is the same.

Since either (11) or (13) is violated, the option in B^{**} will never be exercised. To distinguish this bond from the one with a potentially exercisable option, we introduce the notation B^{N**} for the former. The IR condition for the financier of B^{N**} becomes

$$\sigma_H^H \left(\nu_H + \sum_{k=1}^{k_L^*} \tau_k \right) R_b + (1 - \sigma_H^H) \left(\nu_L + \sum_{k=1}^{k_L^*} \tau_k \right) R_b \geq I - A. \tag{57}$$

If R_b is the same for both bonds, the LHS of (57) exceeds the LHS of (55). Since optimality requires that the financier's IR constraint be binding, B^{N**} will promise a lower yield than B^*, that is, $R_b^* \geq R_b^{N**}$. This is because $k_L^* \geq \widetilde{k}$. A comparison of the IR conditions with B^{**} shows that the yield on a bond with a potentially exercisable option is at least as low or lower than the yield on a bond with an option that will never be exercised, i.e. $R_b^{N**} \geq R_b^{**}$.

Next we show that regardless of $R_b^* \geq R_b^{N**}$, firms will issue non-defeasible bonds B^* when either (11) or (13) is violated. Since the optimal non-defeasible bond grants $\widetilde{k}$ decisions to the financier, giving control the financier over $k_L^* \geq \widetilde{k}$ is suboptimal.

By granting the financier k_L^* decisions, the issuer gains the difference between the LHS of (57) and (55), which is $\sum_{k=\widetilde{k}}^{k_L^*} \tau_k d_k^H R_b^*$. In exchange it gives up $\sum_{k=\widetilde{k}}^{k_L^*} \gamma_k$. Since $\gamma_k \geq \tau_k R$ for all $k > k^*$ and $\widetilde{k} \geq k^*$, the issuer prefers to issue non-defeasible bonds, B^*. ■

Proof of Proposition 7: Since both (15) and (16) hold, the issuer is willing to call the bond or defease the covenants at date 1. The additional gain from exercising the covenant defeasance option relative to calling the bond is $p \sum_{k=1}^{k_L^*} \gamma_k$. The cost differential between the two actions is $\hat{R}_d^1 - \hat{R}_c^2$. If $p \sum_{k=1}^{k_L^*} \gamma_k > \hat{R}_d^1 - \hat{R}_c^2$, then the additional gain from covenant defeasance exceeds the additional cost, and the issuer will prefer to defease the covenants. If $p \sum_{k=1}^{k_L^*} \gamma_k < \hat{R}_d^1 - \hat{R}_c^2$, then the additional gain from covenant defeasance is less than the additional cost, so the issuer prefers to call the bond. ■

Proof of Proposition 8: Assume that both $\hat{R}_d^1 > \hat{R}_c^2$ and $\sum_{k=1}^{k_L^*} \gamma_k \geq \hat{R}_{d,c}^{1,2} - \hat{R}_b$ hold. Then four cases may arise. Case 1: (16) does not hold but (15) holds. The issuer would not call the bond but is willing to defease the covenants. Given that $\hat{R}_{d,c}^{1,2} < \hat{R}_d^1$, the issuer's most preferred action is to defease the covenants and call bond at the same time to redeem it later. In this case callable bonds are only called in conjunction with covenant defeasance. The issuer will defease the covenants and call the bond the same time to redeem it later.

Case 2: Both (15) and (16) hold. The issuer is willing to defease the covenants or call the bond. Since $p\sum_{k=1}^{k_L^*}\gamma_k \geq \hat{R}_d^1 - \hat{R}_c^2$ holds, the issuer would rather defease the covenants than call the bond. However, $\hat{R}_{d,c}^{1,2} < \hat{R}_d^1$. Therefore, the issuer is better off to covenant-defease the bond right away and call it at the same time to redeem it later than to simply defease the covenants.

Case 3: (16) holds but (15) does not hold. The issuer is not willing to defease the covenants but it is willing to call the bond. Since $\sum_{k=1}^{k_L^*}\gamma_k \geq \hat{R}_{d,c}^{1,2} - \hat{R}_b$, the issuer is better off defeasing the covenants and calling the bond at the same time to redeem it later than not defeasing the covenants and calling the bond right away. In this case the issuer would not defease the covenants unless the bond is called the same time to be redeemed later.

Case 4: Neither (15) nor (16) hold. The issuer is not willing to call or covenant-defease the bond. But, since $\sum_{k=1}^{k_L^*}\gamma_k \geq \hat{R}_{d,c}^{1,2} - \hat{R}_b$, it is willing to take a combination of the two actions: to defease the covenants and call the bond the same time to redeem it later. In this case callable (defeasible) bonds are only called (defeased) in conjunction with covenant defeasance (calling). The issuer will defease the covenants and call the bond the same time to redeem it later. ■

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Figure 1: **Fraction of bonds including defeasance and call options, 1992–2019**

The figure shows the yearly fraction of corporate bonds that include the covenant defeasance option, a standard call option, a pure make-whole call option, and a mixed make-whole option. Mixed make-whole bonds are callable at a make-whole price for an initial period and at a standard call price for the remaining period. The sample is 5132 US corporate bonds from Mergent FISD, 1992–2019. We don't plot the fractions for the early sample years (1983-1991) due to a relatively low number of observations in FISD. See Table 1 for the sample selection.

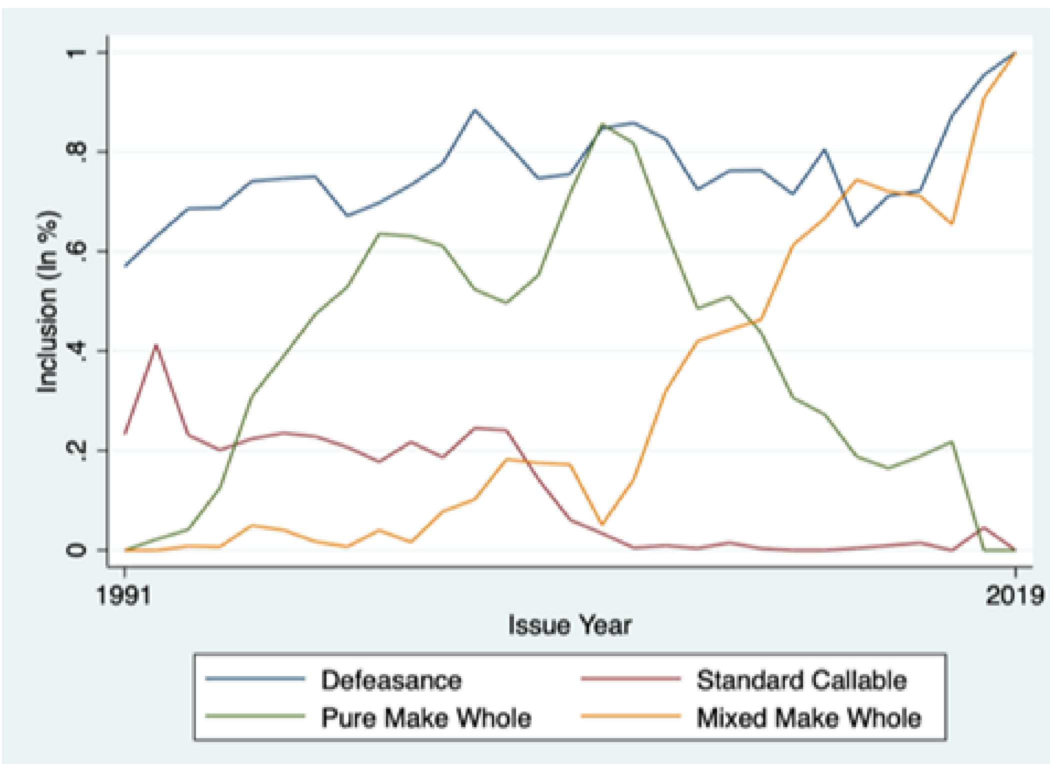

Figure 2: **Inclusion of the covenant defeasance option across underwriters**

The figure shows the fraction of bonds that contains the covenant defeasance option and the number of bonds issued by individual underwriters. The sample is 4806 US corporate bonds from Mergent FISD, 1983–2019, sold by 30 underwriters issuing at least ten bonds each. The largest underwriter in the sample issue 972 bonds. The underwriters are sorted from left to right on the fraction of bonds that include the defeasance option. The average underwriter includes covenant defeasance in 74% (median 76%) of the bonds.

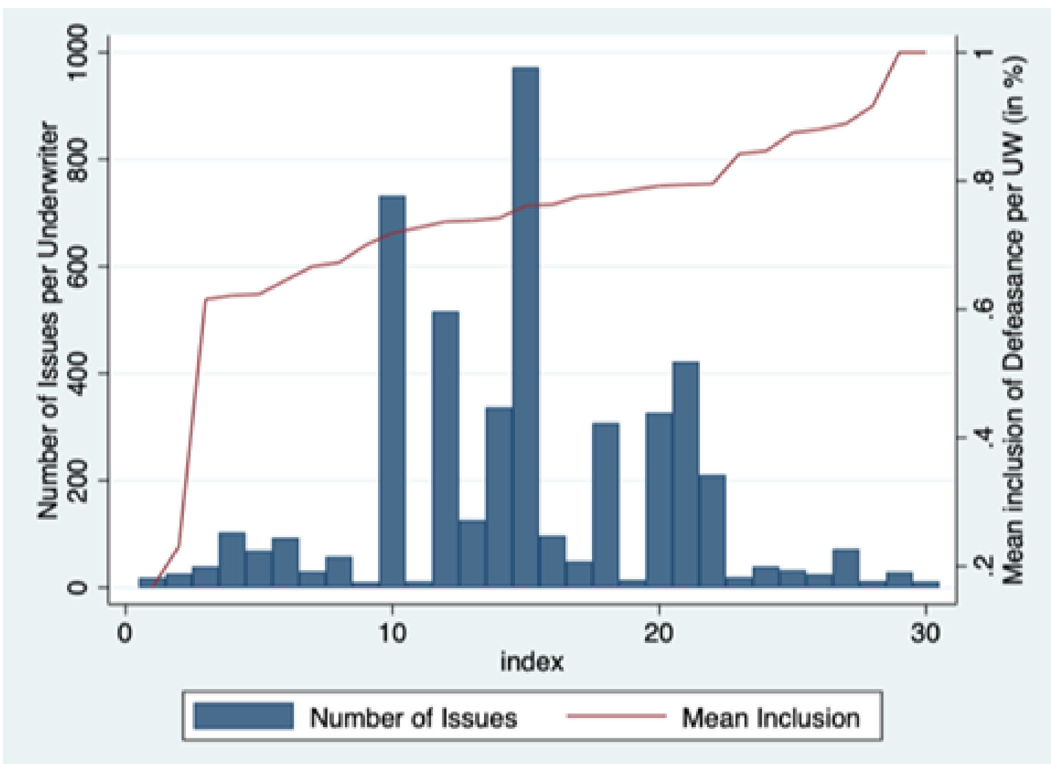

Table 1: **Sample selection**

This table describes how the final sample is constructed, starting with bond issuer and issue data from Mergent Fixed Investment Securities Database (FISD). We restrict the sample to US issuers and standard corporate bond issues. N is the sample size after imposing the restriction.

Sample restriction and data source		N
All issuers in FISD Issuer Table, 1983–2019.		15,839
Select industrial and telecom issuers.	-5,775	10,064
Select issuers in the US.	-2,728	7,336
Merge with bond issues in FISD Issues Table.		49,690
Exclude bonds denominated in foreign currency, bonds of international issuers, government and municipal bonds, asset-backed bonds, private placements, convertible bonds, term notes, zero-coupon bonds, and PIK bonds, and require a subsequent information flag.	-32,720	16,970
Merge with information on the issuer from Compustat, ratings from the FISD Ratings Table, the dispersion in analysts' forecasts from Institutional Brokers Estimate System (I/B/E/S), and interest rates from the Federal Reserve Board.		
Require information on defeasance (sample used for testing **H1**).	-11,810	5,158
Require information on yield at issuance (sample used for testing **H2**).	-1,487	3,671

Table 2: **Variable definitions**

This table provides definitions of the variables used in the analysis. The source variable name is listed in square bracket. The issuer data is from year-end prior to the bond issue. All level items are deflated using the All Urban CPI from Bureau of Labor Statistics.

Variable name	Definition and source
Bond data (FISD):	
Defeasance	Dummy variable indicating that the issue includes a covenant defeasance option [*Covenant defeas wo tax conseq*, table Bondholder Protective].
Number of Covenants	Total number of covenants in tables Bondholder Protective and Issuer Restrictive.
Callable	Dummy that takes value one if the bond is callable.
Offering Yield	The yield to maturity at issuance calculated by FISD [*offering yield*].
Maturity	The number of years to bond maturity.
Bond Size	The total amount (in USD thousands) raised in the bond issue [*Offering amt*].
Rating Category	DEFINE.
Investment Grade	Dummy that takes value one if the issue is rate investment grade and zero otherwise.
Seniority	The seniority of the bond defined as a categorial integer variable ranging from 0 (lowest priority) to 5 (highest priority) [*security level*].
Firm data (Compustat):	
Market to Book Ratio	(Book value of leverage + market value of equity)/Total assets [*(at–seq+prcc_c*csho)/at*].
Sales Growth	Growth in Sales from the previous year [$sale_t/sale_{t-1}$].
log(Market Cap)	Natural logarithm of the issuer's market capitalization, defined as number of shares*share price [*prcc_c*csho*].
Fixed Asset Ratio	Property, Plant and Equipment/Total Assets [$ppent/at$]
EBIT	Earnings before Interest and Taxes [*ib*].
Cash	Cash/Total Assets [che/at].
Investments	Capital Expenditures/Total Assets [$capx/at$].
Leverage	(Total Assets–Shareholders Equity)/Total Assets [*(at-seq)/at*].
KZ Index	The Kaplan and Zingales (1997) index of financial constraints, as implemented by **?**. KZ Index = –1.001909*(Cash Flow/PPE) [$(dp+ib)/ppent_{t-1}$] + 3.139193*(Debt/Total Capital) [$(dltt+dlc)/at$] – 39.3678*(Dividends/PPE) [$(dvc+dvp)/ppent_{t-1}$]– 1.314759*(Cash/PPE) [$che/ppent_{t-1}$].
WW Index	The Whited and Wu (2006) index of financial constraints (quarterly data). WW Index = 0.091*(Cash Flow/Total assets) [$(ib+dp)/at$] +0.062*DIVPOS + 0.021*(Long Term Debt/Total assets) [$dltt/at$] + 0.044*Total Assets [$log(ta)$] + 0.035*Sales Growth [$sales_t/sales_{t-1}-1$] + 0.102*ISG, where DIVPOS=1 if the firm pays cash dividends and ISG is the three-digit industry average Sales Growth.
Interest Coverage Ratio	Cash Flow/Interest Expense [$(ib+dp)/xint$].
Industry Dummies	Indicators 2-digit SIC code
From I/B/E/S:	
Uncertainty	The standard deviation of analyst estimates for next year's EPS. [*stdev*d].
Federal Reserve Board:	
Yield Spread	The difference between the offering yield of the bond and the yield of a US Treasury bill or note with the same maturity, for all bonds with maturity <=10 years, 20 years, & 30 years.
Term Spread	Yield of one-year US T-bill – Yield of a US T-bond with the issue's maturity.
Credit Spread	Difference in yield between a AAA and a BAA bond.
1 yr Treasury Yield	The yield of a one-year US Treasury bill.

TABLE 3: **Summary statistics**

The table presents summary statistics for the inclusion of defeasibility and callability (Panel A), the number of covenants (Panel B), the issuer (Panel C), the bond issue (Panel D), and the market conditions (Panel E). The firm characteristics in Panel C are from the year before the issue. The sample is 5158 US corporate bond issues, see Table 1. All variables are defined in Table 2.

	N	Mean	Std.dev.	Min	Median	Max
	(1)	(2)	(3)	(4)	(5)	(6)
A: Inclusion of defeasibility and callability						
Defeasance	5158	0.75	0.43	0.00	1.00	1.00
Number of Covenants	5158	5.47	2.22	0.00	5.00	14.00
Standard Callable	5158	0.10	0.30	0.00	0.00	1.00
Make Whole Call	5158	0.72	0.45	0.00	1.00	1.00
Pure Make Whole	5156	0.42	0.49	0.00	0.00	1.00
Mixed Make Whole	5156	0.30	0.46	0.00	0.00	1.00
B: Covenants						
Debt Issuance Restrictions	5158	1.01	0.62	0.00	1.00	3.00
Asset Sale Restrictions	5158	1.68	0.65	0.00	2.00	3.00
M&A Covenants	5158	1.37	0.60	0.00	1.00	2.00
Payment Covenants	5158	0.36	0.84	0.00	0.00	3.00
Default Covenants.	5158	0.91	0.62	0.00	1.00	3.00
Financial Covenants	5158	0.22	0.43	0.00	0.00	2.00
C: Bond characteristics						
Yield Spread	3914	1.53	1.29	-1.80	1.17	13.52
Rating Category	5158	9.22	3.75	1.00	9.00	23.00
Absolute Issue Size	5158	553m	605m	2m	400m	1.5bn
Issue Size	5158	0.09	0.19	0.00	0.04	4.45
Issue Year	5158	2005	7.53	1983	2006	2019
Maturity	5158	12.16	10.76	1.00	10.00	100.00
D: Firm characteristics						
KZ Index	4679	-8.55	72.66	-1273.52	-0.87	89.26
WW Index	5158	-0.47	0.34	-6.59	-0.46	0.25
Market Cap in MUSD	5158	3.85	1.73	-3.16	3.94	8.17
Market to Book Ratio	5158	1.88	0.96	0.68	1.60	11.46
Sales Growth	5158	1.13	0.30	0.35	1.07	2.91
Uncertainty	5158	0.40	4.01	0.00	0.06	123.18
Fixed Asset Ratio	5158	0.37	0.25	0.00	0.34	0.98
Leverage	5158	0.64	0.17	0.02	0.63	1.91
Interest Coverage Ratio	5158	16.04	114.06	-312.09	6.03	5107.40
E: Market rates						
Term Spread	5158	1.35	1.10	-1.71	1.28	4.24
Credit Spread	5158	0.94	0.38	0.50	0.86	3.43
T-Bill Yield	5158	2.40	2.14	0.09	1.71	7.76

Table 4: **The distribution of individual covenants in the sample**

The table reports the fraction of bonds containing different covenants. We group covenants according to their role as follows: debt issuance restrictions (Panel A), asset sales (Panel B), M&A (Panel C), payouts (Panel D), default (Panel E), financial covenants (Panel F), and unclassified covenants (Panel G). Column (1) uses the full sample, while columns (2) and (3) use the subsamples of non-defeasible and defeasible bonds, respectively. Column (4) reports the difference between the two subsamples and column (5) a t-test for its significance. In column (6), ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively. The sample is 5158 US corporate bonds, of which 3853 include the defeasance option and 1305 do not. The covenant data is from FISD. Column (7) lists the FISD code of each covenant type.

	Overall Mean N=5158 (1)	**No Def** Mean N=1305 (2)	**Def** Mean N=3853 (3)	Δ (4)	t-value (5)	Sig (6)	Code in FISD (7)
A: Debt issuance restrictions							
Negative pledge	0.77	0.67	0.81	-0.14	-9.6	***	bh2
Indebtedness	0.20	0.1	0.23	-0.13	-12.1	***	ir4
Subordinated debt issuance	0.02	0.01	0.03	-0.02	-5.86	***	ir14
Funded debt	0.01	0.02	0.01	0.01	2.74	**	ir3
Leverage test	0.00	0	0	0	-1.73		ir18
B: M&A restrictions							
Consolidation merger	0.90	0.82	0.93	-0.11	-9.66	***	ir1
Change control put provision	0.47	0.33	0.52	-0.18	-11.75	***	bh8
C: Asset sales restrictions							
Sales assets	0.90	0.81	0.93	-0.11	-9.79	***	ir10
Sales leaseback	0.65	0.55	0.69	-0.13	-8.51	***	ir9
Asset sale clause	0.13	0.04	0.16	-0.12	-15.52	***	bh18
D: Payout restrictions							
Restricted payments	0.15	0.05	0.19	-0.13	-16.5	***	ir8
Transaction affiliates	0.15	0.05	0.19	-0.14	-14.94	***	ir15
Dividend related Payouts	0.05	0.03	0.06	-0.03	-5.01	***	ir2
E: Default covenants							
Cross acceleration	0.66	0.58	0.69	-0.11	-6.9	***	bh7
Cross default	0.19	0.22	0.18	0.04	3.18	**	bh6
Liens	0.05	0.08	0.04	0.04	4.95	***	ir6
F: Financial covenants							
Fixed charge coverage	0.20	0.18	0.21	-0.03	-2.41	*	ir17
Investments	0.01	0	0.01	-0.01	-2.05	*	ir5
Rating decline	0.01	0.01	0.01	0	-1.58		bh10
Declining net worth	0.00	0	0	0	0.58		bh12
Leverage test	0.00	0	0	0	-1.73		ir18
Maintenance net worth	0.01	0.01	0.01	-0.01	-2.02	*	ir7
Net earnings test	0.00	0.01	0	0.01	2.88	**	ir16
G: Unclassified covenants							
Stock transfer	0.02	0.01	0.02	-0.01	-2.93	**	ir13
Stock issuance	0.01	0	0.02	-0.02	-8.38	***	ir12

Table 5: **Testing H1: OLS regression for inclusion of the defeasance option**

The table shows the coefficient estimates from OLS regressions for *Defeasance*, a dummy indicating that the bond includes the covenant defeasance option. All variables are defined in Table 2 and the covenant categories are detailed in Table 4. A constant is included but not reported. All regressions include year, bond maturity, and industry dummies at the 2-digit SIC code level. The sample is 5158 bonds issued by US industrial and telecom issuers, 1983-2019. Standard errors clustered around firms are in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Testing **H1-1**: Number of covenants						
Number of Covenants	0.034***		0.034***		0.034***	
	(4.41)		(4.52)		(4.58)	
Debt Issuance Restrictions		0.071**		0.072**		0.071**
		(2.41)		(2.33)		(2.42)
Asset Sale Restrictions		0.083***		0.085***		0.079***
		(2.99)		(2.93)		(2.85)
M&A Covenants		0.001		0.005		0.005
		(0.02)		(0.17)		(0.17)
Payment Covenants		0.005		-0.001		0.009
		(0.31)		(0.06)		(0.48)
Default Covenants		-0.024		-0.026		-0.025
		(0.99)		(1.14)		(1.04)
Financial Covenants		0.026		0.033		0.029
		(0.80)		(0.94)		(0.88)
Testing **H1-2**: Financial constraints, growth options, and uncertainty						
KZ Index			-0.000***	-0.000***		
			(3.74)	(3.58)		
WW Index					-0.085***	-0.078***
					(3.94)	(3.90)
Market Cap	-0.050***	-0.052***	-0.049***	-0.050***	-0.054***	-0.055***
	(3.41)	(3.68)	(3.23)	(3.46)	(3.58)	(3.83)
Market to Book Ratio	0.027*	0.027*	0.031*	0.030*	0.032*	0.031**
	(1.69)	(1.76)	(1.86)	(1.86)	(1.96)	(2.01)
Sales Growth	0.062	0.060				
	(1.49)	(1.53)				
Uncertainty	0.003**	0.002**	0.003**	0.003**	0.003**	0.003**
	(2.18)	(2.15)	(2.27)	(2.29)	(2.23)	(2.20)
Control variables in **X1**: Bond, firm, and market characteristics						
Standard Callable	0.030	0.050	0.026	0.050	0.033	0.051
	(0.71)	(1.15)	(0.59)	(1.06)	(0.78)	(1.16)
Make Whole Call	0.070**	0.072**	0.077**	0.078**	0.073**	0.074**
	(2.37)	(2.44)	(2.45)	(2.51)	(2.42)	(2.50)
Issue Size	-0.113*	-0.106*	-0.112*	-0.102	-0.101	-0.094
	(1.79)	(1.67)	(1.75)	(1.58)	(1.56)	(1.45)
Rating	-0.003	-0.003	-0.002	-0.001	-0.003	-0.003
	(0.70)	(0.59)	(0.39)	(0.25)	(0.62)	(0.55)
Fixed Asset Ratio	-0.158*	-0.154*	-0.164*	-0.165*	-0.161*	-0.158*
	(1.89)	(1.86)	(1.91)	(1.96)	(1.92)	(1.91)
Leverage	-0.180**	-0.170**	-0.180**	-0.166**	-0.191***	-0.181***
	(2.50)	(2.39)	(2.43)	(2.27)	(2.69)	(2.59)
Interest Coverage Ratio	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(1.50)	(1.52)	(0.82)	(0.82)	(1.55)	(1.58)
Term Spread	0.000	-0.004	0.000	-0.004	-0.000	-0.005
	(0.00)	(0.34)	(0.02)	(0.32)	(0.03)	(0.37)
Credit Spread	0.082***	0.074***	0.078***	0.070**	0.080***	0.072***
	(2.93)	(2.71)	(2.77)	(2.52)	(2.84)	(2.63)
T-Bill Yield	-0.005	-0.006	0.001	0.000	-0.005	-0.006
	(0.36)	(0.49)	(0.11)	(0.01)	(0.36)	(0.48)
R^2	0.19	0.20	0.20	0.21	0.19	0.20
N	5,158	5,158	4,679	4,679	5,158	5,158

Table 6: **Testing H2: OLS regressions for the bond yield**

The table shows the coefficient estimates from OLS regressions for $Yield\ Spread$ (the yield spread to a maturity-matched zero-coupon Treasury bond), addressing the predictions of **H2**. All variables are defined in Table 2. A constant is included but not reported. All regressions include bond maturity, year, and industry dummies at the 2-digit SIC code level. The sample is 3718 bonds issued by US industrial and telecom issuers, 1983-2019. Standard errors clustered around firms are in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Testing **H2**: Defeasibility and callability						
Defeasance	-0.141**	-0.131*	-0.139**	-0.140**	-0.131*	-0.137**
	(2.09)	(1.71)	(2.05)	(2.10)	(1.73)	(2.06)
Standard Callable	0.396***	0.362**	0.397***	0.415***	0.375**	0.417***
	(2.68)	(2.46)	(2.69)	(2.81)	(2.55)	(2.82)
Defeasance * Standard Call	0.438**	0.489**	0.428**	0.461**	0.507**	0.452**
	(2.15)	(2.44)	(2.11)	(2.27)	(2.53)	(2.23)
Make Whole Call	-0.281***	-0.275***	-0.286***			
	(3.46)	(3.17)	(3.50)			
Defeasance * Make Whole	0.143*	0.144	0.148*			
	(1.78)	(1.63)	(1.83)			
Pure Make Whole				-0.234***	-0.236***	-0.238***
				(2.80)	(2.67)	(2.84)
Defeasance * Pure Make Whole				0.089	0.099	0.093
				(1.03)	(1.07)	(1.07)
Mixed Make Whole				-0.176	-0.208*	-0.181*
				(1.62)	(1.77)	(1.66)
Defeasance * Mixed Make Whole				0.221**	0.213**	0.227**
				(2.36)	(2.06)	(2.42)
Financial constraints, growth options, and uncertainty						
KZ Index		0.001***			0.001***	
		(6.23)			(6.41)	
WW Index			0.148***			0.149***
			(6.24)			(6.44)
Market Cap	-0.129***	-0.118***	-0.120***	-0.130***	-0.119***	-0.120***
	(5.50)	(5.07)	(5.20)	(5.60)	(5.15)	(5.32)
Market to Book Ratio	-0.072***	-0.084***	-0.079***	-0.073***	-0.084***	-0.080***
	(2.64)	(2.94)	(2.90)	(2.70)	(2.98)	(2.96)
Sales Growth	-0.019			-0.023		
	(0.22)			(0.26)		
Uncertainty	0.009	0.008	0.009	0.009	0.008	0.009
	(1.08)	(0.97)	(1.07)	(1.04)	(0.94)	(1.03)
Firm, issue, and market characteristics						
Number of Covenants	0.102***	0.103***	0.103***	0.096***	0.099***	0.097***
	(7.41)	(7.34)	(7.50)	(7.05)	(7.14)	(7.12)
Issue Size	0.512	0.540*	0.505	0.500	0.531*	0.493
	(1.63)	(1.77)	(1.63)	(1.60)	(1.75)	(1.60)
Rating	0.110***	0.109***	0.110***	0.108***	0.107***	0.108***
	(9.38)	(9.40)	(9.42)	(9.26)	(9.18)	(9.30)
Fixed Asset Ratio	0.113	0.095	0.108	0.089	0.073	0.085
	(0.73)	(0.58)	(0.69)	(0.57)	(0.44)	(0.54)
Leverage	0.598***	0.507***	0.602***	0.612***	0.517***	0.617***
	(3.89)	(3.15)	(3.92)	(4.00)	(3.24)	(4.04)
Interest Coverage Ratio	0.000	0.000	0.000	0.000	0.000	0.000
	(0.73)	(0.34)	(0.78)	(0.65)	(0.40)	(0.71)
Credit Spread	1.272***	1.165***	1.273***	1.280***	1.172***	1.281***
	(11.65)	(12.66)	(11.64)	(11.76)	(12.83)	(11.75)
Term Spread	-0.060**	-0.051*	-0.060**	-0.061**	-0.052**	-0.061***
	(2.51)	(1.96)	(2.54)	(2.56)	(2.01)	(2.59)
T-Bill Yield	0.034	0.034	0.036	0.036	0.037	0.038
	(1.17)	(1.17)	(1.23)	(1.24)	(1.24)	(1.30)
R^2	0.67	0.68	0.67	0.67	0.68	0.68
N	3,671	3,314	3,671	3,671	3,314	3,671

Table 7: **Propensity Score Matching**

This table shows the results of propensity score matching (PSM), where defeasance is the treatment. Panel 1 shows the average treatment effect on the treated (ATT), defined as the differential in yield spread between bonds with and without defeasance. We use Stata's *teffects* command with the *psmatch* option, which implements Abadie and Imbens (2016)'s standard errors. A negative sign for ATT means that the decision to include defeasance implies a reduction in the bond's issue yield. The sample is 2539 defeasible US corporate bonds matched to 994 unique non-defeasible bonds, 1983–2019. Panel 2 lists the coefficient estimates in the PSM probit regression. Column (1) regresses the dummy variable $Defeasance$, indicating that the bond includes the defeasance option, on the independent variables in model (1) of Table 5, while column (2) separates the make-whole bonds into pure make-whole and mixed make-whole. The coefficients are used to compute the propensity score underlying the matching. All variables are defined in Table 2. Standard errors clustered around firms are in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
Panel A: Yield effect of defeasance inclusion		
ATT	-0.174 ***	-0.208***
	(0.071)	(0.076)
N	3,533	3,533
N Defeasable bonds	2,539	2,539
N Non-defeasable bonds	994	994
Panel B: Probit regression for the defeasance inclusion decision		
Tests of **H1-1**: Number of covenants		
Number of Covenants	0.034***	0.034***
	(3.90)	(3.88)
Testing **H1-2** and **H1-3**: Growth options and uncertainty		
Sales Growth	0.058	0.058
	(1.25)	(1.25)
Market to Book Ratio	0.029	0.029
	(1.50)	(1.50)
Uncertainty	0.005***	0.005***
	(2.70)	(2.70)
Control variables in **X1**: firm, bond, and market characteristics		
Standard Callable	-0.041	-0.044
	(0.75)	(0.79)
Make Whole Call	0.036	
	(1.03)	
Pure Make Whole		0.035
		(1.01)
Mixed Make Whole		0.032
		(0.64)
Firm, bond and market characteristics	Yes	Yes
Industry Dummies	Yes	Yes
Maturity Dummies	Yes	Yes
Year Dummies	Yes	Yes
N	3,533	3,533

Table 8: **Matching Diagnostics**

This table shows the diagnostic results for the propensity score matching regressions of Table 7, where defeasance is the treatment. The sample is 2539 defeasible US corporate bonds matched to 994 unique non-defeasible bonds, 1983–2019. The variance ratio is the ratio of the variances for each co-variate between the treated and the matched control group. Columns (3) and (7) uses the full, unadjusted sample, while columns (4) and (8) uses the matched sample.

	Diagnostics for Column (1) of Table 7				Diagnostics for Column (2) of Table 7			
	Coefficients		Variance Ratio		Coefficients		Variance Ratio	
	Raw	Matched	Raw	Matched	Raw	Matched	Raw	Matched
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tests of **H1-1**: Number of covenants								
Number of Covenants	0.49	-0.12	1.11	0.79	0.49	-0.13	1.11	0.77
Tests of **H1-2** and **H1-3**: Financial constraints, uncertainty and growth options								
Market Cap	-0.24	0.21	0.93	0.97	-0.24	0.16	0.93	0.93
Sales Growth	0.07	0.03	2.38	1.68	0.07	0.04	2.38	1.65
Market to Book Ratio	0.05	0.21	0.94	1.47	0.05	0.19	0.94	1.37
Uncertainty	0.05	0.08	4.91	13.84	0.05	0.06	4.91	8.71
Control variables in **X1**: firm, bond, and market characteristics								
Standard Callable	-0.02	-0.13	0.93	0.59	-0.02	-0.13	0.92	0.60
Make Whole Call	0.18	0.09	0.77	0.86				
Pure Make Whole Call					0.05	0.13	1.01	1.02
Mixed Make Whole Call					0.10	-0.05	1.08	0.97
Issue Size	0.12	-0.02	0.85	0.52	0.12	0.00	0.85	0.63
Fixed Asset Ratio	-0.38	-0.05	0.86	0.91	-0.38	-0.03	0.86	0.92
Book Leverage	-0.12	-0.01	1.26	1.15	-0.12	0.01	1.26	1.13
Rating Category	0.20	-0.19	1.04	0.89	0.20	-0.15	1.04	0.87
Interest Coverage Ratio	-0.08	0.08	0.07	2.37	-0.08	0.04	0.07	1.85
T-Bill Yield	-0.16	-0.03	0.91	0.90	-0.16	0.00	0.91	0.90
Term Spread	0.08	-0.07	0.93	0.94	0.08	-0.12	0.93	0.98
Credit Spread	0.22	0.13	1.97	1.28	0.22	0.09	1.97	1.09

Table 9: **Lee and Bradley-Roberts Procedure: Yield Regressions**

In the first panel of this table we run an OLS regression with the offering yield from FISD as the left hand variable. It represents the second stage of the Lee and Bradley-Roberts procedure. We run separate regressions for bonds with and without defeasance. Each regression includes issue characterizes, firm characteristics and the one year Treasury rate, the term, and credit spread: $YTM = \beta_1 \cdot defeasance + \beta_2 \cdot FirmControls + \beta_3 \cdot IssueControls + \delta_1 \cdot OtherControls + \epsilon_i$. In addition we include IMR ND (for bonds without defeasance) and IMR D (for bonds with defeasance), the inverse Mills ratios from the first stage defeasance regression with defeasance as the left hand variable. The first stage regressions differ with respect to whether we included ales growth or market to book as a control for growth options. The heading of each specification indicates what proxy for growth options we are using. We use year clustering for standard errors. In the second panel of this table we use the coefficient estimates to compute yield predictions for each bond in our sample. This gives us two predicted yields for each bond, one without and one with defeasance. We report the average yield and the implied yield differential in panel two and run a t-test to see if the difference is statistically different from zero. A negative yield differential indicates that bonds with a defeasance clause included demand a lower yield. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively.

	(1)		(2)	
	No Def	Def	No Def	Def
Panel A: Predicted Yield Spread				
N=3493	1.50	1.45	1.50	1.46
$\Delta(D - ND)$	-0.054 **		-0.048*	
Panel B: OLS regressions				
Inverse Mills Ratio				
IMR ND	0.043		0.039	
	(0.30)		(0.27)	
IMR D		-0.197		-0.175
		(1.17)		(1.04)
Key variables for testing **H2**				
Standard Callable	0.406**	0.637***	0.410***	0.693***
	(2.57)	(4.26)	(2.60)	(4.65)
Make Whole Call	-0.124	-0.148**		
	(1.38)	(1.99)		
Pure Make Whole			-0.120	-0.138*
			(1.36)	(1.86)
Mixed Make Whole			-0.050	0.061
			(0.44)	(0.63)
Firm Controls from Table 5	Yes	Yes	Yes	Yes
R^2	0.63	0.70	0.63	0.70
N	987	2,506	987	2,506
Panel C: Probit Regressions for Defeasance Inclusion				
Implied Yield Difference	-0.073		-0.072	
	(0.28)		(0.28)	
Number of Covenants	0.037**		0.036**	
	(2.09)		(2.31)	
Uncertainty	0.002		0.002	
	(0.22)		(0.21)	
Sales Growth	0.042		0.042	
	(0.52)		0.52)	
Market to Book Ratio	0.032		0.032	
	(1.34)		(1.36)	
N	3,493		3,493	

Table 10: **Appendix Table 1: Probit regression for inclusion of the defeasance option**

The table shows the coefficient estimates from OLS regressions, where the dependent variable indicates whether the bond includes a covenant defeasance option, addressing **H1**. All variables are defined in Table 2 and the covenant categories are detailed in Table **??**. The key explanatory variables are the number of covenants (**H1-1**), the KZ and WW indexes for financial constraints (**H1-2**), and proxies for future uncertainty and growth options (**H1-3**). A constant is included but not reported. All regressions include year dummies, and industry dummies at the 2-digit Standard Industry Classification (SIC) code level. The sample is 5001 bonds issued by US industrial and telecom issuers, 1983-2019. Following **?**, standard errors clustered around firms are in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively.

Tests of **H1-1**: Action-limiting covenants						
Number of Covenants	0.034***		0.034***		0.034***	
	(4.64)		(4.73)		(4.81)	
No. of Asset Sale Restrictions		0.067***		0.073***		0.069***
		(2.58)		(2.66)		(2.63)
No. of Debt Issuance Restrictions		0.067**		0.068**		0.068**
		(2.40)		(2.36)		(2.41)
No. of Bankruptcy Covs.		-0.021		-0.021		-0.021
		(0.98)		(1.00)		(0.98)
No. of M&A Restrictions.		-0.001		-0.004		-0.003
		(0.05)		(0.15)		(0.10)
No. of Payout Restrictions		0.026		0.018		0.031
		(1.26)		(0.85)		(1.49)
No. of Financial Covs.		0.032		0.035		0.028
		(0.90)		(0.93)		(0.79)
Tests of **H1-2** and **H1-3**: Uncertainty, growth options, & financial constraints						
Uncertainty	0.005***	0.004**	0.006***	0.004**	0.005***	0.004**
	(2.58)	(2.11)	(2.64)	(2.10)	(2.58)	(2.11)
Sales Growth	0.034	0.034				
	(1.61)	(1.62)				
Market to Book Ratio	0.028*	0.027*	0.031*	0.029*	0.031**	0.030**
	(1.83)	(1.85)	(1.81)	(1.76)	(1.97)	(1.99)
Kaplan Zingales Index			-0.000***	-0.000***		
			(3.23)	(3.02)		
Whited Wu Index					-0.110***	-0.107***
					(4.09)	(4.00)
Control variables: firm, bond, and market characteristics						
Rating Category	-0.002	-0.003	-0.001	-0.001	-0.002	-0.003
	(0.50)	(0.64)	(0.13)	(0.25)	(0.40)	(0.57)
Interest Coverage Ratio	-0.000*	-0.000*	-0.000	-0.000	-0.000*	-0.000*
	(1.88)	(1.87)	(0.30)	(0.18)	(1.91)	(1.91)
T-Bill Yield	-0.004	-0.006	0.003	0.001	-0.003	-0.005
	(0.33)	(0.50)	(0.25)	(0.12)	(0.23)	(0.42)
Term Spread	-0.002	-0.007	-0.002	-0.006	-0.001	-0.006
	(0.19)	(0.59)	(0.12)	(0.52)	(0.12)	(0.53)
Credit Spread	0.094***	0.086***	0.092***	0.083***	0.092***	0.084***
	(2.90)	(2.75)	(2.85)	(2.66)	(2.85)	(2.69)
Issue Size	-0.105*	-0.102*	-0.107**	-0.100*	-0.097*	-0.094*
	(1.94)	(1.83)	(2.01)	(1.83)	(1.78)	(1.70)
log(Market Cap)	-0.046***	-0.049***	-0.045***	-0.047***	-0.050***	-0.053***
	(3.43)	(3.74)	(3.23)	(3.53)	(3.65)	(3.97)
Fixed Asset Ratio	-0.144*	-0.149*	-0.153*	-0.163**	-0.148*	-0.155*
	(1.77)	(1.88)	(1.85)	(2.02)	(1.83)	(1.95)
Leverage	-0.188***	-0.176**	-0.197***	-0.180**	-0.203***	-0.191***
	(2.59)	(2.45)	(2.61)	(2.40)	(2.81)	(2.67)
Standard Callable	0.034	0.041	0.028	0.040	0.035	0.040
	(0.85)	(0.99)	(0.67)	(0.93)	(0.86)	(0.97)
Make Whole Call	0.056**	0.059**	0.063**	0.066**	0.058**	0.062**
	(2.22)	(2.35)	(2.37)	(2.50)	(2.29)	(2.45)
N	5,040	5,040	4,572	4,572	5,033	5,033
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes

Table 11: **Appendix Table 2: Examples of Covenant Defeasance Option Exercise**

This table illustrates 55 cases of defeasance exercise from 1993 to 2013. The information is taken from 8K statements of the various issuers.

Firm	Year	Red	Rep	DefAMT	Reason	Fundingsource
Advanced Accessory Systems	2003	Y	N	125	M & A	
Aleris International, Inc.	2006	N	Y		M & A	
Aleris International, Inc.	2006	N	Y		M & A	
Alliance One International	2013	Y	N	635	Refinancing	Debt Issuance
Ameren Corp	2010	N	N	2.7		
Aztar Corporation	2007	Y	N	175	M & A	
Calenergy Co	1994	N	N	35.7	M & A	Debt Issuance
Callon Petroleum Co	2003	Y	N	22.9	Refinancing	Debt Issuance
Callon Petroleum Co	2003	Y	N	40	Refinancing	Debt Issuance
Colony Rih Holdings Inc	2007	Y	N	192	Refinancing	Debt Issuance
Communications & Power Industries	2004	Y	N	74	M & A	
Dollar Financial Group Inc	2003	Y	N	129	Refinancing	Debt Issuance
Extendicare Health Services	2003	N	N		Refinancing	Debt Issuance
Extendicare Health Services	2003	N	N		Refinancing	Debt Issuance
Foodmaker Inc	1994	N	N		M & A	
Forest City Enterprises Inc	2004	Y	N	75	Asset Sale	Debt Issuance
General Nutrition Corp	2004	Y	Y	215	Refinancing	
Gibraltar Industries	2013	N	Y	143		
Greyhound Lines Inc	2005	Y	N	155	Refinancing	Debt Issuance
Griffon Corp	2010	N	N	.15	M & A	
Griffon Corp	2010	N	N	.15	M & A	
Hilfiger Tommy Corp	2006	Y	N		M & A	
Host Marriott Corp/Md	1995	Y	N	13	M & A	Debt Issuance
Hovnanian Enterprises Inc	2013	Y	N	36.7	Refinancing	Debt Issuance
Hovnanian Enterprises Inc	2013	Y	N	3	Refinancing	Debt Issuance
Hudbay Minerals Inc	2007	N	Y	2.9	Release of Collateral	
Iac/Interactivecorp	2004					
Ikon Office Solutions Inc	2003	N	Y	.4	Asset Sale	Cash
Isle Of Capri Casinos Inc	1999	Y	N		M & A	Debt Issuance
Las Vegas Sands Inc	2002	Y	Y	108	Refinancing	Credit Line
Liberty Global	2006	Y	N	448		
Majestic Star Casino Llc	1999	Y	N	99	Refinancing	Debt Issuance
Martin Marietta Corp /Md/	1994	N	N	125	M & A	Equity Issuance
Mgm Mirage	2009	Y	N	100	Asset Sale	Debt issuance & Equity
Mississippi Power Co	2005	N	N	30		
Morgans Hotel Group Co.	2007	N	Y	139	M & A	
Nrg Energy, Inc.	2011	Y	N	371	M & A	
Nrg Energy, Inc.	2006	N	Y	.4	Refinancing	Debt Issuance
Panavision Inc	2005	Y	N	64.8	Refinancing	Debt Issuance
Pepsi Bottling Group Inc	2002	N	N	160	M & A	Debt Issuance
Price Communications Corp	2002	Y	N	525	M & A	
Price Communications Corp	2002	Y	N	175	M & A	
Prudential Bank & Trust	1997	N	N	450	Asset Sale	
Revlon Consumer Products	2013	Y	Y	138	Refinancing	Debt Issuance
Revlon Consumer Products	2005	Y	N	75.5	Refinancing	Debt Issuance
Revlon Consumer Products	2005	Y	N	116	Refinancing	Debt Issuance
Revlon Inc	2009	Y	Y	341	Refinancing	Debt Issuance
Rj Reynolds Tobacco Holdings Inc	2000	N	N	98	M & A	
Scott Paper Co	1994	N	N	223	Asset Sale	Asset Sale
Sealed Air Corp	2011	Y	N		M & A	Equity Issuance
Sealed Air Corp	2011	Y	N		M & A	Equity Issuance
Smucker J M Co	2007	N	Y	115	M & A	Cash & Credit Line
Transdigm Holding	2003	N	Y	2.25	M & A	
Travelcenters Of America	2007	Y	N	250	M & A	
United Online Inc	2008	N	Y		M & A	
Univision Television	1996	N	N	85	M & A	Equity Issuance
Yellow Corp	2003	N	Y	20	Refinancing	Cash