Inside Debt and the Design of Corporate Debt Contracts

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Abstract

Agency theory posits that debt-like compensation (such as defined-benefit pensions and other deferred compensation) aligns managerial interests more closely with those of debtholders and reduces the agency cost of debt. Consistent with theory, we find that a higher CEO relative leverage, defined as the ratio of the CEO's inside leverage (debt-to-equity compensation) to corporate leverage, is associated with lower cost of debt financing and fewer restrictive covenants, for a sample of private loans originated during 2006-2008. These findings persist after accounting for the endogeneity of CEO relative leverage, and are more pronounced for firms with higher default risk. Additional analysis on a sample of new public bond issues also shows a negative relation between CEO relative leverage and bond yield spread. Overall, the evidence supports the notion that debtholders recognize the incentive effects of executive debt-like compensation and adjust the terms of corporate debt contracts accordingly.

JEL classifications: G32; G34; J33; M12
Keywords: Executive Compensation; Inside Debt; Debt Contracting

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We are indebted to Alex Edmans for detailed comments and suggestions, to Justin Murfin for sharing a program to calculate loan contract strictness, and to Michael R. Roberts for sharing the DealScan-Compustat link data. We thank Ting Chen, Valentin Dimitrov, Aloke Ghosh, Suresh Govindaraj, Carolyn Levine, Carol Marquardt, Thomas Noe, Bharat Sarath, Xuan Tian, Sheri Tice, and workshop participants at Baruch College, the City University of New York and Rutgers Business School for useful comments and suggestions. All errors and omissions are ours alone.
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1. Introduction

Defined-benefit pensions and other deferred compensation arrangements are an important feature of contemporary executive compensation in the United States (Bebchuk and Jackson 2005, Sundaram and Yermack 2007). Anecdotal evidence shows that the importance of pensions and other deferred compensation is on the rise—the *Wall Street Journal* reported that pension benefits for top executives at S&P 500 firms rose an average of 19% in 2008.[1] Despite the prevalence of pensions and other deferred compensation in executive pay, research on the economic consequences of these arrangements remains limited.

In pensions and other deferred compensation arrangements, a firm promises to pay executives fixed amounts at or after retirement. These promised future payments, often unfunded and unsecured, resemble debt claims against the firm. Agency theory posits that such debt-like compensation can weaken managerial incentives to transfer wealth from debtholders to stockholders (Jensen and Meckling 1976, Sundaram and Yermack 2007, Edmans and Liu 2010). When an executive's compensation consists of both debt-like claims and equity claims on the firm, her incentives vary with the relative importance of debt- versus equity-based compensation in her pay structure (her "inside leverage"). The higher an executive's inside leverage relative to firm leverage (hereafter, the higher her "relative leverage"), the more closely her incentives are aligned with debtholders vis-à-vis stockholders and the lesser the degree to which she engages in risk-taking to the detriment of firm debtholders (Sundaram and Yermack 2007, Edmans and Liu 2010).

[1] Ellen E. Shultz and Tom McGinty, "Pensions for executives on the rise", *The Wall Street Journal*, November 3, 2009.

This study investigates the effect of executive debt-like compensation on the design of corporate debt contracts (in particular, the cost of debt financing and the usage of covenants). If debtholders recognize the incentive effects of debt-like compensation, firms providing their executives with higher relative leverage should bear a lower cost of borrowing and fewer covenants limiting their investing, financing, and payout decisions after debt issuance.

We examine this hypothesis with a sample of private loan contracts. We focus on private loans since private lending dominates the market for corporate debt.[2] For a sample of 1,462 private loans originated in 2006-2008, we find that firms with higher CEO relative leverage pay a lower cost for debt financing (i.e., lower loan spreads) and face fewer restrictive covenants, after controlling for CEO tenure, CEO cash compensation (salary and bonus), CEO incentives derived from equity-based compensation (delta and vega), and related loan features and firm characteristics. In terms of economic significance, increasing CEO relative leverage by one standard deviation would reduce the cost of debt by seven cents for every $100 drawn down from a loan. For comparison, decreasing the corporate leverage ratio by one standard deviation reduces the cost of debt by 17 cents for every $100 drawn.

The analysis above treats CEO compensation as exogenous. A potential concern is that the terms of corporate debt contracts can affect the way executive compensation contracts are written. This concern of reverse causality, however, is less relevant in our setting because we examine whether CEO relative leverage affects contracting on *new* debt issues. Our focus on new debt issues helps to establish a causal link from existing

[2] Houston and James (1996) estimate that only 17% of outstanding corporate debt is public, with the rest being private, intermediated debt. Dichev and Skinner (2002) report that private debt makes up 80% of corporate debt for their sample of large Compustat firms.

compensation structures to prospective debt contracting, to the extent that future debt contract terms cannot be fully anticipated by compensation committees.[3]

Another concern is that CEO compensation contracts and corporate debt contracts are endogenously determined by unobservable factors that relate to firms' credit risk. To account for potential endogeneity, we use state individual tax rates as an instrument for CEO relative leverage. In so far as tax planning is a consideration for top executives, CEOs subject to higher marginal tax rates on their income have stronger incentives to defer income to a later period through pension plans and other deferred compensation arrangements, as this income may be taxed at lower rates after retirement. Therefore, we expect CEO relative leverage to be positively associated with state individual tax rates. CEO individual tax rates are, however, unlikely to directly affect the cost of debt or covenant usage, making it a valid instrument for examining the relationship between relative leverage and corporate debt contracting. We also use industry median CEO relative leverage as an additional instrument for firm-level CEO relative leverage, following Hanlon, Rajagopal and Shevlin (2003). We find that the negative relation between CEO debt-like compensation and both cost of debt and covenant usage is robust to instrumental variables estimation.

In cross-sectional tests, we find that the effect of debt-like compensation on debt contracting (i.e., lower cost of debt and fewer covenants) is particularly strong in firms with low Altman's Z-score and below-investment-grade credit rating. These findings are consistent with the notion that the risk-reducing incentives created by CEO debt-like

[3] Brockman, Martin and Unlu (2010) adopts a similar setting (i.e. examining new debt issues) to address the reverse causality concern that the term structure of corporate debt can affect equity incentives written into the CEO's compensation.

compensation are most relevant for firms with high default risk, as debtholders are especially likely to be concerned about risk-shifting in such firms.

In the analyses above, we follow prior literature to measure covenant strictness by counting the number of covenants present in a loan package or a bond agreement (e.g., Bradley and Roberts 2004; Nikolaev 2010). However, the initial slack allowed for each covenant and the covariance between covenants also affect the overall strictness of the contract (Murfin 2009). Using a novel measure of loan contract strictness proposed by Murfin (2009) that captures the ex-ante probability of covenant violation, we show that CEO relative leverage is negatively related to the overall strictness of new loan contracts.

In additional analyses, we examine potential countervailing effects of debt-like compensation. In practice, executive pension claims may be given advantageous treatment compared to the claims of outside debtholders via special arrangements such as an early-payment option or secured benefits upon bankruptcy. As a result, outside debtholders may face greater claim dilution as executive pension "debt" increases, which could lead to them charging a higher cost of debt or imposing more covenants. We use the magnitude of inside debt to capture the degree of potential claim dilution. We find some evidence in firms with high default risk that covenant usage increases when the magnitude of inside debt (relative to total corporate debt) becomes substantial. This claim dilution effect is, however, apparent only for a very small subsample of firms.

Finally, we examine the implications of CEO relative leverage for contracting by public bondholders, who may lack the ability and incentives to monitor borrowers effectively, particularly compared to private lenders. Using a sample of newly issued public bonds in 2006-2008, we find that firms with higher CEO relative leverage face lower bond yield spreads. We do not find a significant association between CEO relative leverage and covenant usage. This lack of association stands in contrast to Chava, Kumar and Warga (2010) who find that firms providing their CEOs with larger pension compensation (relative to their total pay) are less likely to have covenants in public bond contracts, for a small sample of firms. Our finding is consistent, however, with public bondholders being less effective than private lenders at monitoring covenants, and with covenants therefore being more valuable in private vis-à-vis public debt issues (Rajan and Winton 1995, Bradley and Roberts 2004).

This study makes several contributions. First, we extend the emerging literature on the economic consequences of executive debt-like compensation. For a sample of non-financial firms, Sundaram and Yermack (2007) show that firms providing their CEOs with higher relative leverage have lower likelihood of default. Tung and Wang (2010) provide similar evidence for the banking industry. Gerakos (2007) shows that firms granting larger CEO pensions receive better credit ratings. We show that debt-like compensation also plays a role in the corporate debt contracting process.

Second, we contribute to the literature on executive compensation and in particular its effect on debt contracting. Existing literature has focused largely on equity-based compensation. Consistent with equity-based compensation exacerbating stockholder-debtholder conflicts, prior studies show that equity-based compensation leads to higher agency costs of debt (John and John 1993), more frequent use of covenants in debt contracts (Begley and Feltham 1999, Chava, Kumar and Warga 2010), and shorter debt maturities (Brockman, Martin and Unlu 2010).

This literature till date has, however, "overlooked almost entirely the widespread practice of compensating CEOs with debt" (Sundaram and Yermack 2007). Two studies address this issue: Wei and Yermack (2010) document a significant increase in bond prices for firms disclosing sizeable debt-like compensation immediately following the SEC's expanded disclosure regulations on executive compensation. Chava, Kumar and Warga (2010) find that public bond contracts are less likely to include covenants when CEOs receive large pension benefits. We complement these studies by showing that private lenders also appear to value the incentive effects of debt-like compensation. Our findings are economically meaningful since private lending dominates the market for corporate debt. Further, compared with the public debt market, the relative sophistication of private lenders as monitors and the riskier profile of firms that resort to the private debt market (Denis and Mihov 2003, Bradley and Roberts 2004) allow us a powerful setting to study the effectiveness of inside debt compensation in the resolution of stockholder-debtholder agency conflicts.

Finally, we add to the literature on the endogenous determination of executive compensation contracts that may be chosen simultaneously with other contracts in the firm (Himmelberg, Hubbard and Palia 1999; Palia 2000). We demonstrate that state individual tax rates serve as a valid instrument for the relative intensity of debt- to equity-based pay in the CEO's compensation package, which could be useful for future research.

Section 2 provides institutional background on debt-like compensation arrangements. Section 3 reviews related literature and develops hypotheses. Section 4 describes the sample and variable measurement. Section 5 presents empirical results on the relationship between CEO relative leverage and the design of private loan contracts. Section 6 discusses additional analyses, and Section 7 concludes.

2. Debt-like compensation arrangements

A deferred compensation arrangement involves a promise from the firm to pay its employees pre-specified amounts on a preset schedule in the future, and is therefore similar to corporate debt in the structure of payoffs. Defined-benefit pensions represent the largest component of deferred compensation. In defined-benefit pension plans, the employee is promised an annual pension payable after retirement, with the exact benefits being a function of the number of years of credited service, the employee's final (or career-average) salary and the benefit accrual formula.

For U.S. firms, tax-qualified defined-benefit plans are required to be funded at a certain minimum level and are insured by the Pension Benefit Guaranty Corporation (PBGC), making these claims riskless to an extent. However, tax-qualified plans are subject to caps on eligible compensation and benefit levels, which severely limit postretirement benefits for top executives. As a result, the vast majority of top executive pensions come from non-tax-qualified Supplemental Executive Retirement Plans (SERPs). SERPs are typically unfunded, unsecured, and not guaranteed by the PBGC, exposing them to the risk of firm bankruptcy and making them similar to risky debt. [4]

Deferred compensation may also take on other forms, such as plans that allow top executives to voluntarily defer the receipt of salary, bonus, long-term incentives, or stock awards. The deferred amounts are credited to a separate account and investment return

[4] Some portion of executive pensions takes the form of defined-contribution pension plans. Unlike defined-benefit pensions, defined-contribution pensions do not have debt-like characteristics. In a defined-contribution plan, the firm does not take on an obligation to pay its employees a fixed amount in the future; instead, the firm simply contributes a fixed amount into the employee's account each period. The investment risk and mortality risk from that point onwards is borne by the employee.

(or interest) is credited at a pre-specified rate. These plans are, again, usually unfunded, making the fixed payoffs contingent on firm solvency and similar to the payoffs on unsecured corporate debt.[5]

3. Related literature and hypothesis development

3.1 Stockholder-debtholder conflicts and debt-like compensation

Stockholder-debtholder conflicts arise from the fundamentally different structure of the payoffs from stock versus debt—debtholders are fixed claimants whereas stockholders are residual claimants to firm assets. Once debt has been issued, stockholders (or managers, acting on behalf of stockholders) can increase the value of their claims at the expense of debtholders in many ways (Jensen and Meckling 1976, Myers 1977, Smith and Warner 1979). Specifically, stockholders can disgorge firm assets through large dividend payouts or issue additional debt of the same or senior priority (claim dilution). Stockholders may reject projects with positive net present value (NPV) if project returns accrue largely to debtholders (underinvestment). Finally, stockholders may replace low-risk projects with high-risk projects (asset substitution or risk-shifting).[6] Stockholders' incentives to undertake these wealth-expropriating actions intensify as the firm approaches distress.

Agency theory posits that an optimal compensation contract needs to include inside debt to mitigate stockholder-debtholder conflicts (Jensen and Meckling 1976, Edmans

[5] The stated purpose of deferred compensation plans is usually to assist top executives in planning for retirement, since the Internal Revenue Code places limits on the amount of compensation that can be put away in tax-qualified retirement accounts such as 401(k) plans.
[6] This does not alter the value of the firm as a whole if both low-risk as well as high-risk projects have similar NPV. Stockholders may even have perverse incentives to accept *negative* NPV projects if the increase in cash flow variance is large enough. Since stockholders' residual claims are convex in nature, any increase in risk increases the value of their claims at the expense of debtholders.

and Gabaix 2009, Edmans and Liu 2010).[7] When an executive is compensated only with equity, she has incentives to increase firm risk beyond a level that debtholders prefer, and to take actions that transfer wealth from debtholders to stockholders (John and John 1993). However, if an executive is compensated with both debt and equity, her wealth-transfer incentives weaken. When an executive's personal debt-to-equity ratio grows larger than the corporate debt-to-equity ratio, she may even have incentives to increase the value of debt at the expense of equity by, for example, engaging in risk-reducing activities (Sundaram and Yermack 2007, Edmans and Liu 2010).

Recent empirical studies confirm that inside debt aligns managerial decision-making more closely with debtholders' preferences. Sundaram and Yermack (2007) find that CEOs with inside leverage that is high relative to corporate leverage manage their firms in such a way that they have lower distance-to-default. In the banking industry, Tung and Wang (2010) find that high CEO relative leverage corresponds to lower stock return volatility and fewer high-risk investments such as mortgage-backed securities. Gerakos (2007) finds a positive association between CEO pension benefits and firm debt ratings, suggesting that inside debt also improves credit agencies' perceived credit quality of the firm. Similarly, for a small sample of 151 firms, Chava, Kumar and Warga (2010) find that public bond contracts are less likely to include covenants when CEOs receive large pension benefits. For a sample of public bonds traded on the secondary market, Wei and Yermack (2010) document an increase in bond prices following more transparent

[7] A handful of theoretical papers predict that fixed compensation should be part of the optimal compensation contract (e.g., Nachman and Noe 1995, Noe 2009) but do not provide empirical predictions on the difference between inside debt and other forms of fixed compensation such as salary and bonus. Edmans and Liu (2010) argue that pensions are a superior solution to salary and solvency-contingent bonus in reducing agency costs of debt because pension values are sensitive not only to the incidence of bankruptcy but also to the firm's liquidation value in bankruptcy, while salaries or solvency-contingent bonuses are affected only by the incidence of bankruptcy.

compensation disclosures in 2007, for firms whose CEOs have substantial pension and deferred compensation. These findings support the notion that debt-based compensation reduces agency costs borne by corporate debtholders.

3.2 The design of debt contracts

If debtholders anticipate opportunistic behavior by stockholders and managers, they will demand a higher return for providing debt financing (i.e., higher cost of debt). However, raising the cost of debt does not prevent debtholders from being expropriated by stockholders after debt issuance. Since the firm's investing and financing strategy cannot be completely contracted on ex ante, stockholders and managers still retain the discretion to take actions that transfer wealth from debtholders ex post (Leland 1998).

Thus, debtholders may include provisions in debt contracts ("covenants") that restrict the actions managers can take after debt issuance. Debt covenants may restrict actions (e.g. paying out dividends, disposing assets, issuing additional debt), endorse other actions (e.g. maintaining the firm's properties), or require the maintenance of certain financial ratios (e.g., imposing minimum net worth or interest coverage).[8] Upon violation of covenants, control rights are transferred to lenders, granting them the opportunity to intervene in the firm's investment and financing decisions (Chava and Roberts 2008).

Therefore, raising the cost of debt and imposing covenants represent two primary mechanisms that debtholders rely on to protect their interests. The greater the potential

[8] For example, covenants restricting the sale of firm assets can constrain asset substitution, by making it more costly for stockholders to substitute variance-increasing assets for the ones currently owned by the firm (Smith and Warner 1979). Covenants restricting sale-and-leaseback arrangements prevent the stockholders from taking on lease obligations which dilute debtholders' claims, since leases and rental agreements are usually senior obligations. Covenants restricting dividend payouts not only prevent stockholders from disgorging assets, but also force reinvestment of internally generated cash flows, mitigating underinvestment.

for stockholders (or managers) to expropriate from debtholders, the higher will be the cost of debt financing, and the greater the use of covenants in debt contracts.

3.3 Hypothesis development

As discussed in Section 3.1, debt-like compensation is expected to align managerial incentives closer to those of debtholders, and reduce the likelihood of managers taking actions to transfer wealth from debtholders to stockholders. If debtholders recognize these incentive effects, they would accept a lower cost for debt financing from firms with high CEO relative leverage. They would also place fewer covenants restricting managerial actions for these firms. This leads to the first hypothesis:

> *Hypothesis 1: Higher CEO relative leverage is associated with lower cost of debt financing and fewer restrictive covenants in debt contracts.*

Stockholders' incentives to engage in wealth-expropriating activities intensify as the firm approaches default. For example, debtholders face higher risk of excessive dividend payouts when default risk is high, since stockholders fear that they will not be able to extract any cash from the firm once it declares bankruptcy (Chava, Kumar and Warga 2010). Similarly, firms approaching default usually have little value as ongoing entities and limited growth opportunities; such firms face lower costs to taking on high-risk, negative-NPV projects and hence are more likely to engage in risk-shifting. Given that debtholders' concerns of being expropriated from are more relevant in firms with high default risk, the role played by debt-like compensation in mitigating these concerns would be more prominent in such firms. This leads to the second hypothesis:

> *Hypothesis 2: The negative association of CEO relative leverage with cost of debt and covenant restrictions is stronger for firms with high default risk.*

Both hypotheses build on the theoretical proposition that debt-like compensation mitigates stockholder-debtholder conflicts. However, in practice, CEO pension arrangements often contain institutional features that may create countervailing effects. We address this issue in Section 6.2.

4. Sample, variable measurement, and descriptive statistics

4.1 Sample selection

We retrieve data on CEO equity compensation, pensions and other deferred compensation from the ExecuComp database for fiscal years 2006-2008. On August 29, 2006, the SEC issued a new rule on proxy disclosure of executive compensation, requiring tabular disclosure of the present value of benefits accrued under pensions and other deferred compensation plans. These recently available disclosures allow us to provide large-sample evidence on the role of executive debt-like compensation in debt contracting, albeit only for 2006 and after.

We collect cost of debt, covenant, and other loan information for private loans issued between January 1, 2006 and May 31, 2009 from the Loan Pricing Corporation's DealScan database. DealScan provides comprehensive coverage of commercial loans made to U.S. firms (Bradley and Roberts 2004). Financial statement data for control variables are collected from Compustat Industrial Annual Files.[9] Similar to Bradley and Roberts (2004) and Chava and Roberts (2008), we exclude financial firms (SIC codes 6000-6999). These sample selection criteria, summarized in Table 1, yield a sample of 1,462 facilities and 1,267 packages. A "facility" is a loan (the basic unit in DealScan), and a "package" may contain several facilities. While loan pricing is usually at the

[9] Matching borrowers from DealScan to Compustat is challenging due to lack of a common identifier. To implement matching, we rely on the link file established and maintained by Michael Roberts and WRDS. We are indebted to Michael Roberts for sharing the link file.

facility level, covenants are written at the package level. Thus, in multivariate analyses we examine the cost of debt at the facility level and covenant usage at the package level.

4.2 Variable measurement

We now discuss the motivation and construction of the variables used in our analyses. Appendix A provides detailed variable definitions.

4.2.1 Measuring relative leverage

As noted by Sundaram and Yermack (2007) and Edmans and Liu (2010), the CEO's personal debt-to-equity ratio *relative to* her firm's debt-to-equity ratio is the relevant metric for measuring the CEO's incentive alignment with debtholders versus stockholders. If the CEO's personal debt-to-equity ratio is lower than the firm's debt-to-equity ratio, the CEO has incentives to increase risk to a greater extent than that desired by outside debtholders, and *vice versa*. Therefore, we define CEO relative leverage as the CEO's debt-to-equity ratio divided by the firm's debt-to-equity ratio (*RELATIVE_LEV*).[10]

We measure the CEO's debt-to-equity ratio as the CEO's debt holding divided by her equity holding. The CEO's debt holding is the sum of the actuarial present value of CEO's accumulated benefits under defined-benefit pension plans and her total balance in any deferred compensation plans at the fiscal year-end. The CEO's equity holding is the fair value of the CEO's equity holdings including stock, restricted stock, and option holdings. The firm's debt-to-equity ratio is defined as the sum of long-term debt and debt in current liabilities divided by the market value of equity at the fiscal year-end.

[10] Our results are qualitatively similar if we measure relative leverage based on debt- and equity-based compensation aggregated for all named executives.

4.2.2 Measuring cost of debt and covenant usage

We follow Bradley and Roberts (2004) and measure the cost of debt financing (*COSTDEBT*) using "All-in-drawn Spread" (expressed in basis points scaled by 100) promised at the inception of the loan. The All-in-drawn spread consists of the upfront fee, the coupon spread, the utilization fee as well as any recurring annual fees, and is essentially the cost to the borrower for each dollar drawn down from the loan.

To measure covenant usage, we follow Chava and Roberts (2008) and identify 16 distinct financial covenants and one investment covenant found in the lending agreements in our sample. We then count the number of covenants present in a package to measure the extent of covenant restrictions (*COVENANT*). Appendix B provides a complete list of the covenants used in constructing *COVENANT*.

4.2.3 Measuring control variables

We use three groups of control variables to capture cross-sectional variation in compensation structure as well as in debt contracting: CEO characteristics and compensation structure, loan characteristics, and borrowing firm characteristics. Appendix A presents detailed definitions of the control variables.

In the first group, we control for CEO tenure, as CEOs who have been with the firm longer accrue more deferred compensation (Sundaram and Yermack 2007). We also control for the risk-taking or risk-avoiding incentives created by other components of compensation. Fixed payments such as salary may mitigate CEO risk-taking incentives since payouts are contingent on solvency. Begley and Feltham (1999) provide evidence that cash compensation is associated with fewer covenant restrictions in loan contracts. In addition, Duru, Mansi and Reeb (2005) argue that earnings-based bonus plans motivate managers to seek stable cash flows, and document that high bonus compensation is associated with lower cost of debt. Therefore, we control for CEO cash compensation including salary and bonus. Furthermore, Coles, Daniel and Naveen (2006) find that CEO incentives derived from equity-based compensation affect the riskiness of investment policy choices. Accordingly, we control for the change in CEO wealth for a 1% change in stock price (the CEO's portfolio delta) and for a 1% change in stock return volatility (the CEO's option vega). Since portfolio delta varies with firm size, we follow Edmans, Gabaix and Landier (2009) and scale delta by annual total compensation, resulting in a more theoretically correct measure of incentives that is independent of size and allows for comparison across firms.

The second group is loan characteristics. Bradley and Roberts (2004) show that larger and longer-maturity loans are more likely to include covenants, consistent with covenants and short-maturity debt being substitutes in solving agency problems (Myers 1977). Accordingly, we control for the loan amount and the loan maturity in months. We also control for characteristics of the lending banks. Bradley and Roberts (2004) show that larger lending syndicates tend to administer riskier loans, and Denis and Mihov (2003) show that riskier firms are more likely to obtain debt from investment banks. Accordingly, we control for the size of the lending syndicate and the identity of the lead arranger as investment bank, US bank, or foreign bank.

The third group is firm characteristics that relate to the intensity of stockholder-debtholder conflicts. Smaller firms, firms with fewer tangible assets in place, and firms in poor financial health are more likely to have debt covenants (Bradley and Roberts 2004). Leveraged firms with high growth opportunities are more likely to suffer from high agency costs of debt, since there is a greater likelihood of managers passing on high-NPV opportunities (Myers 1977). However, these firms may also be less likely to have certain types of covenants, since reduced operational flexibility is likely to be particularly costly for them (Nash, Netter and Poulsen 2003). Therefore, we control for firm size, profitability, growth opportunities, leverage, asset tangibility, cash flow volatility, and default risk measured by the Altman's (1968) Z-score.[11]

Finally, we include year fixed effects and industry fixed effects using the Fama and French (1997) 12-industry classification as additional controls for inter-temporal and industry variation in CEO compensation and debt contracting.

4.3 Descriptive statistics and correlations

Table 2, Panel A displays summary statistics of the variables. To minimize the effect of outliers, we winsorize continuous variables (except for loan amount and loan maturity) at the one-percentile level. On average, borrowers pay $1.25 for every $100 drawn down from the loan, and the median package carries 1 covenant. Similar to Wei and Yermack (2010), the distribution of relative leverage (*RELATIVE_LEV*) is right-skewed with mean and median of 1.29 and 0.33 respectively.

For firms in our sample, CEO tenure is 6.5 years on average. The mean annual salary and cash bonus for the CEOs are $892,000 and $243,000, respectively. The average delta (i.e., change in the CEO's portfolio value for a 1% change in stock price, scaled by annual total compensation) for our sample is 0.12, and average vega (i.e., change in the CEO's option portfolio value for 1% change in stock-return volatility) is $252,000. As for loan characteristics, the mean (median) loan facility amount is approximately $787

[11] We calculate Altman's Z-score for manufacturing firms using updated coefficients from Hillegeist, Keating, Cram and Lunstedt (2004). We calculate Z-score for non-manufacturing firms using coefficients suggested by Altman (2000). Lower values of Z-score correspond to higher default risk.

million ($350 million), while loan maturity is on average 4.4 years. The median facility has eight lenders in the syndicate. We identify lead arrangers being investment banks (7.2% of facilities), U.S. banks (85.9% of facilities), and foreign banks (20% of facilities). Turning to firm characteristics, our sample consists mostly of large firms with mean (median) market capitalization of $12 billion ($3 billion).

Table 2, Panel B displays Pearson and Spearman correlations among debt contracting variables and CEO relative leverage. Our primary interest is whether debtholders incorporate relative leverage into debt contracting decisions. Both *COVENANT* and *COSTDEBT* have significantly negative correlations with *RELATIVE_LEV*, consistent with expectation. We turn next to multivariate regression analyses to further investigate these associations.

5. Empirical Results

5.1 Baseline specification

We test *Hypothesis 1* with the following model specification (subscript *i* indexes firm and *t* indexes time):

$$\begin{aligned}
&COSTDEBT_{i,t}(COVENANT_{i,t}) = \alpha_0 + \alpha_1 RELATIVE_LEV_{i,t} \\
&+ \alpha_2 \ln(TENURE)_{i,t} + \alpha_3 \ln(SALARY)_{i,t} + \alpha_4 \ln(BONUS)_{i,t} + \alpha_5 DELTA_{i,t} + \alpha_6 VEGA_{i,t} \\
&+ \alpha_7 \ln(AMOUNT)_{i,t} + \alpha_8 \ln(MATURITY)_{i,t} + \alpha_9 N_BANK_{i,t} + \alpha_{10} IB_{i,t} + \alpha_{11} USBANK_{i,t} \\
&+ \alpha_{12} FRBANK_{i,t} + \alpha_{13} \ln(MVE)_{i,t-1} + \alpha_{14} ROA_{i,t-1} + \alpha_{15} BM_{i,t-1} + \alpha_{16} LEV_{i,t-1} \\
&+ \alpha_{17} TANGIBILITY_{i,t-1} + \alpha_{18} SIGMAOCF_{i,t-1} + \alpha_{19} ALTMANZ_{i,t-1} \\
&+ \text{Year fixed effects} + \text{Industry fixed effects} + \varepsilon_{i,t} \qquad (1)
\end{aligned}$$

The dependent variable is cost of debt financing (*COSTDEBT*) or the number of financial covenants (*COVENANT*). The key variable of interest is CEO relative leverage (*RELATIVE_LEV*). *Hypothesis 1* predicts a negative coefficient on *RELATIVE_LEV*. All regression variables are defined in Section 4.2. Since relative leverage can be reasonably anticipated at the beginning of the year given the terms of pension and other deferred compensation plans, we examine the impact of relative leverage on contemporaneous debt contracting.

We first examine the effect of CEO relative leverage on the cost of debt financing. Since all-in-drawn spread (*COSTDEBT*) is specified by facility, the *COSTDEBT* analyses are performed at the facility level. Ordinary least squares results are presented in column (1) of Table 3. Consistent with *Hypothesis 1*, the coefficient estimate on *RELATIVE_LEV* is negative and significant at 1% level based on a two-tailed t-test, indicating that higher relative leverage is associated with lower cost of debt financing. The effect of relative leverage on the cost of debt is also economically significant—increasing *RELATIVE_LEV* by one standard deviation (3.452) reduces the cost of debt by seven cents for every $100 drawn down from a loan. For comparison, the effect of one standard deviation change in corporate leverage *LEV* is about 17 cents for every $100 drawn.

Next, we examine the effect of CEO relative leverage (*RELATIVE_LEV*) on covenant usage (*COVENANT*). Covenants are usually contracted at the package level, and each package can contain several facilities. To avoid artificially boosting statistical power, we keep the largest facility in a package for the *COVENANT* analyses.[12] Table 3, column (2) reports the results of estimating Eq. (1) using ordinary least squares (OLS) when *COVENANT* is used as the dependent variable. The coefficient estimate on *RELATIVE_LEV* is negative and significant at 5% based on a two-tailed t-test, which confirms *Hypothesis 1* that higher relative leverage is associated with fewer covenants. Given the discrete nature of *COVENANT,* we repeat the analysis using ordered probit

[12] We re-run our tests with all facilities in a package, and weight average control variables related to facility characteristics whenever appropriate. The results (untabulated) are virtually the same.

analysis. The ordered-probit results are reported in column (3) of Table 3. As shown, the coefficient estimate on *RELATIVE_LEV* remains significantly negative.[13]

Turning to control variables, we find that the annual bonus (ln(*BONUS*)) is significantly negatively associated with covenant usage, consistent with Begley and Feltham (1999) and Duru, Mansi and Reeb (2005). Consistent with Bradley and Roberts (2004), we find that larger syndicates (*N_BANK*) write more covenants. Smaller loans (ln(*AMOUNT*)) and loans with investment banks (*IB*) as lead arrangers tend to have higher cost of debt, consistent with Denis and Mihov (2003). Larger firms (ln(*MVE*)) tend to have lower cost of debt and fewer covenants, possibly due to lower credit risk. Contrary to Nash, Netter and Poulsen (2003), firms with high growth opportunities (lower *BM*) are subject to lower cost of debt but more covenants.[14] Finally, firms with higher financial leverage (*LEV*) and more volatile operating cash flows (*SIGMAOCF*) have higher cost of debt.

Given that our key variable of interest, *RELATIVE_LEV*, is the ratio of inside leverage to corporate leverage, it is unclear whether our results are attributable mainly to the numerator or the denominator. There are two potential "denominator" effects—a denominator effect from inside equity ownership, and a denominator effect from corporate leverage. In untabulated results, we first decompose *RELATIVE_LEV* into the inside debt-to-firm debt ratio and inside equity-to-firm equity ratio, and find a significantly negative coefficient on the inside debt-to-firm debt ratio. We also replace

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[13] For brevity, in subsequent tests we only report ordinary least squares results when *COVENANT* is used as the dependent variable, but the results are qualitatively similar when ordered-probit analysis is used.

[14] Nash, Netter and Poulsen (2003) show that growth opportunities are associated with fewer covenants restricting dividends and additional debt issuances. They do not find such a negative relation between growth opportunities and the use of other types of covenants. Since we do not distinguish between different types of covenants in our dependent variable, our results could reflect the fact that high-growth firms in general tend to have greater potential for stockholder-debtholder conflicts due to greater managerial discretion in these firms, as predicted by the contracting literature.

RELATIVE_LEV with inside leverage, and find a significantly negative coefficient on inside leverage. These tests confirm that our results are not driven by a "denominator" effect either from inside equity or from corporate leverage.

Overall, we document a negative relationship between CEO relative leverage and both cost of debt financing and covenant usage, after controlling for related factors known to affect debt contracting.[15] Given the theoretical prediction that the CEO's interests are better aligned with debtholders vis-à-vis stockholders when her personal debt-to-equity ratio is high relative to the firm's debt-to-equity ratio, our results are consistent with debtholders recognizing this incentive alignment and writing debt contracts accordingly.

5.2 Identification

The analyses above assume CEO relative leverage to be exogenous. This assumption is reasonable since contracting terms in *new* private loans are unlikely to be fully anticipated when designing existing CEO compensation structure. Nevertheless, we face the concern that compensation contracts and corporate debt contracts are endogenously determined by certain unobservable firm characteristics (e.g., factors relating to firms' credit risk), which would bias estimated coefficients in Table 3.

To alleviate this endogeneity concern, we adopt an instrumental variable approach. We exploit the fact that pensions and other deferred compensation arrangements are valuable tax planning tools for executives since they allow executives to defer income to a later period (i.e., after retirement) when this income may be taxed at a lower marginal

[15] Our baseline specification, while controlling for a wide range of CEO, firm, and loan characteristics, may not be exhaustive. In additional tests, we control for CEO age in addition to CEO tenure. We add an indicator variable to identify family firms, following Anderson, Mansi and Reeb (2003). We also re-estimate our results excluding firm-years with CEO turnover. Our results are robust to these checks.

rate (Scholes et al. 2002).[16] Anecdotal evidence also suggests that tax planning is an important driver of deferred compensation in practice.[17] Hence, we use the individual tax rates of the state in which the firm is headquartered as an instrument for CEO relative leverage. State individual tax rates satisfy the conditions for a valid instrument. First, CEOs facing a higher marginal tax rate on current income should have stronger incentives to accept deferred compensation, predicting a positive association between the CEO's individual state tax rates and relative leverage, *ceteris paribus*.[18] Second, state individual tax rates are unlikely to directly affect corporate debt contracting.

We specify the two-stage instrumental variable (IV) model as follows:

First-Stage:

$$RELATIVE\_LEV_{i,t} = \alpha_0 + \alpha_1\, IV_t + \sum_{q=2}^{m} a_q (q^{th} ControlVariables) + \varepsilon_{i,t} \tag{2}$$

Second-Stage:

$$COSTDEBT_{i,t}\ (COVENANT_{i,t}) = \alpha_0 + \alpha_1 FIT\_RELATIVE\_LEV_{i,t} + \sum_{q=2}^{m} a_q (q^{th} ControlVariables) + \varepsilon_{i,t} \tag{3}$$

We estimate the above equations using two-stage least squares, with the same set of control variables specified in Eq. (1). In the first-stage regression, the instrumental variable (*IV*) includes the maximum tax rate for wages (*TAXRATE_WAGE*), the maximum tax rate for long-term capital gains (*TAXRATE_GAIN*), and the maximum mortgage subsidy rate (*TAXRATE_MORT*) faced by a CEO in the state where her firm is

[16] An exception arises if SERP benefits are funded in a secular trust arrangement (i.e. the assets in the trust are protected from the firm's creditors in the event of bankruptcy). In such an arrangement, the CEO incurs an immediate tax liability upon funding. In practice, however, secular trusts are very rare not only because they do not offer tax benefits to CEOs, but also since they are controversial with creditors and other employees (Sundaram and Yermack 2007).

[17] For instance, Ford Motor Co states in its 2007 proxy statement: "Under our Deferred Compensation plan, certain salaried employees may defer up to 50% of base salary and up to 100% of awards under the Incentive Bonus plan. This unfunded plan provides the opportunity to save for the future, while postponing payment of income taxes on the deferred compensation."

[18] The underlying assumption is that the state in which a CEO's firm is headquartered either adopts residence tax jurisdiction if a CEO resides in the state, or adopts source tax jurisdiction if a CEO resides in another state.

headquartered.[19] We expect CEO relative leverage to be positively associated with *TAXRATE_WAGE* and *TAXRATE_GAIN*, and negatively associated with *TAXRATE_MORT*, since the mortgage subsidy reduces the CEO's overall tax burden.

Table 4, Panel A reports the two-stage least squares results. In the first-stage regressions, relative leverage (*RELATIVE_LEV*) is significantly positively related to the state income tax rate (*TAXRATE_WAGE*) and negatively related to the mortgage subsidy rate (*TAXRATE_MORT*), consistent with the intuition that CEOs facing higher effective tax rates hold a larger amount of debt-like compensation and have higher relative leverage. In the second-stage regressions, coefficient estimates on fitted relative leverage (*FIT_RELATIVE_LEV*) are negative and significant, confirming that results from our baseline specification in Table 3 are robust to correcting for potential endogeneity.

In Table 4, Panel B, we use an alternative instrument for *RELATIVE_LEV*—the median relative leverage in the firm's industry in the same fiscal year (*IND_RELATIVE_LEV*).[20] This approach follows prior literature that has used industry-level compensation as an instrument for firm-level compensation (Hanlon, Rajagopal and Shevlin 2003), assuming that industry-level compensation practices affect firm-level compensation practices but have little direct impact on firm-level debt contracting. As expected, firm-level relative leverage is significantly positively correlated with industry-level relative leverage. We find again that *FIT_RELATIVE_LEV* is negative and significant in the second-stage regressions. Overall, the two-stage least square results

[19] These rates are calculated using TAXSIM model (See http://www.nber.org/~taxsim/state-rates/ and Feenberg and Coutts (1993) for a complete description).
[20] We use Fama French 49-industry classification to obtain a refined instrumental variable for firm-level relative leverage and require each industry-year to have at least 5 observations. We use median (instead of mean) industry relative leverage to mitigate the effect of outliers as relative leverage is highly skewed.

suggest that the negative association between CEO relative leverage and cost of debt (or covenant usage) is unlikely to be driven by unobservable firm-specific characteristics.

5.3 The Effect of firm default risk

If the incentive effects of CEO relative leverage are incorporated into debt contracting, we expect the relation between relative leverage and debt contracting to be stronger when borrowing firms' default risk is higher (*Hypothesis 2*). We use two alternative proxies for default risk: Altman's Z-score and S&P credit rating. We first estimate Eq. (1) separately for firms with below industry median Altman's Z-score (high default risk) and firms with above industry median Altman's Z-score (low default risk). Table 5, Panel A presents results. For regressions with *COSTDEBT* as the dependent variable, the negative relationship between relative leverage (*RELATIVE_LEV*) and cost of debt (*COSTDEBT*) is more pronounced for firms with low Altman's Z-score. Likewise, for regressions with *COVENANT* as the dependent variable, the negative relationship between relative leverage (*RELATIVE_LEV*) and covenants (*COVENANT*) is statistically significant only in the subsample of firms with low Altman's Z-score.

We also partition the sample conditional on whether firms receive investment-grade rating (at or above BBB- based on S&P credit rating). Table 5, Panel B presents regression results. Again, the negative relationship between relative leverage (*RELATIVE_LEV*) and cost of debt (*COSTDEBT*) exists within both partitions, but is substantially stronger within the subsample of below-investment-grade-rating firms. On the other hand, the negative relationship between relative leverage (*RELATIVE_LEV*) and covenants (*COVENANT*) exists only in the subsample of firms with below investment-grade-rating. Overall, results reported in Table 5 support the notion that relative leverage plays a more important role in debt pricing and covenant design when borrowing firms have high default risk.

6. Additional Analyses

6.1 Additional measure of loan contract strictness

In previous analyses, we measure covenant strictness by counting the number of covenants placed in a loan contract or a bond agreement. This count index is commonly used in the literature as a measure of contract strictness (e.g., Bradley and Roberts 2004; Nikolaev 2010) since a contract with more covenants will give the lender more contingent control (Murfin 2009). In addition to the prevalence of covenants, the initial slack for each covenant and the covariance between covenants also affects the extent to which the contract restricts the borrower's actions and the resulting possibility of covenant violation. Following the procedure developed by Murfin (2009), we construct a measure of loan contract strictness that incorporates the initial slack allowed for each covenant as well as the covariance between the covenants included in a contract.

Specifically, we first estimate for each fiscal year the variance-covariance matrix of quarterly changes in financial ratios commonly contracted upon for all leveraged Compustat firms during the past ten years. To maintain sample size and avoid inducing non-positive definite matrices, we focus on five major covenants—Min. EBITDA to Debt, Min. Interest Coverage, Max. Capex, Min. Net Worth, and Min. Current Ratio.[21] Second, for each covenant in our sample loan packages, we calculate initial slack as the

[21] When calculating the quarterly changes in financial ratios, all balance sheet items are measured at the end of the current quarter while income statement or cash flow statement items are calculated on a rolling four-quarter basis. Specifically, based on Compustat quarterly data items, for each fiscal quarter t, EBITDA-to-Debt = $\ln(\sum_{i=0}^{3} OIBDPQ_{t-i}/(DLTTQ_t+DLCQ_t))$; CAPEX = $\ln(\sum_{i=0}^{3} CAPEXQ_{t-i})$ where quarterly $CAPEXQ$ is inferred from $CAPXY$; Interest_Coverage = $\ln(\sum_{i=0}^{3} OIBDPQ_{t-i}/\sum_{i=0}^{3} XINTQ_{t-i})$; Net_Worth = $\ln(ATQ_t-LTQ_t)$; and Current Ratio = $\ln(ACTQ_t/LCTQ_t)$.

difference between the natural logarithm of the observed ratio in the first quarter of the contract and the natural logarithm of the minimum allowable ratio (or the negative of the difference in case of a maximum ratio). Finally, we estimate the probability of a covenant violation (*COVENANT_PROB*) by combining the initial slack of all covenants in a sample loan package using a multivariate normal cumulative distribution function, based on the estimated variance-covariance matrices. *COVENANT_PROB* is highly skewed as 38% of our sample loan packages have no covenants; therefore we convert *COVENANT_PROB* to a tercile rank variable *COVENANT_STRICT* in multivariate analyses.

For the 1,061 new loan packages with available data, we estimate Eq. (1) replacing the dependent variable with *COVENANT_STRICT*. Table 6 shows that the coefficient estimate on *RELATIVE_LEV* is significantly negative, indicating that higher CEO relative leverage is associated with lower overall strictness in contracts. This association is again more pronounced for firms with higher default risk, measured by Altman Z score.[22] These finding confirm that private lenders take into account CEO relative leverage when determining the overall strictness of the loan contract at the very inception of the loan.

6.2 Countervailing effects of inside debt: claim dilution

While the debt-like nature of pensions and other deferred compensation could mitigate agency costs of debt in theory, the actual design of these arrangements may create countervailing effects. For instance, many firms allow CEOs to take a lump-sum pension payout at retirement and/or to retire ahead of the normal age, effectively allowing the CEO to demand payment of her debt earlier than contracted. Moreover, although

[22] Results are qualitatively similar if we partition the sample based on investment-grade credit rating, and are hence not reported for brevity.

executive pensions are exposed to bankruptcy risk, firms often use special arrangements that shield executive pension assets from the firm's general debtholders (Bebchuk and Jackson 2005). Bebchuk and Jackson (2005) report that firms going through Chapter 11 reorganization often assume in full their executive pension obligations, even though outside debtholders receive only a part of their claims. Therefore, CEO pension benefits may effectively be more senior than the claims held by general debtholders.[23]

The presence of such effectively senior inside debt could imply dilution of outside debtholders' claims, leading to a lower likelihood of outside debtholders successfully recovering their capital in the event of bankruptcy. In this case, outside debtholders may respond to inside debt by increasing the cost of debt financing and by including more covenants restricting managerial actions, contrary to *Hypothesis 1*.

The average (median) ratio of CEO inside debt to total corporate debt in our sample is only 0.65% (0.18%). Hence, even if the entire amount of debt-like compensation is senior to outside debt, potential claim dilution may be inconsequential and hence may not impact debtholders' behavior. Nevertheless, the claim dilution effect may be economically meaningful for firms with CEOs who have accumulated a large amount of inside debt relative to corporate debt. To test this proposition, we augment Eq. (1) with an indicator variable *HIGHDEBTPCT*, which is set to one if the ratio of inside to outside debt is above the 95th percentile of the annual in-sample distribution.[24] The modified specification is as follows:

[23] These features could be consistent either with firms offering special incentives to attract and retain talented CEOs (the optimal contracting view), or with powerful CEOs in poorly-governed firms extracting advantageous compensation terms in a stealthy manner (the rent extraction view proposed by Bebchuk and Fried 2004 and Bebchuk and Jackson 2005). We do not take a position on whether these features reflect optimal contracting or rent extraction, as disentangling the two views is beyond the scope of this paper.

[24] This corresponds to a ratio of inside debt to corporate debt of 2.52% in 2006, 2.68% in 2007, and 2.73% in 2008. There is also cross-sectional variation in the extent to which SERPs are funded, secured in a

$$COSTDEBT_{i,t}\ (COVENANT_{i,t}) = \alpha_0 + \alpha_1 RELATIVE\_LEV_{i,t} + \alpha_2 HIGHDEBTPCT_{i,t} + \sum_{q=2}^{m} a_q (q^{th} ControlVariables) + \varepsilon_{i,t} \quad (4)$$

If debtholders believe that a large amount of inside debt creates claim dilution, we expect to observe a positive coefficient on α_2. We partition our sample into low- versus high-default risk firms, since stockholder-debtholder conflicts may be economically relevant only to firms with high default risk.

Table 7 displays the results of estimating Eq. (4) for subsamples with above- versus below-industry median level of Altman's Z-score.[25] When *COSTDEBT* is the dependent variable, coefficient estimates on *HIGHDEBTPCT* are not statistically significant in either subsample. However, when *COVENANT* is the dependent variable, we observe an interesting contrast in the coefficients on *HIGHDEBTPCT* across the subsamples. When the possibility of default is low (high Altman's Z-score), the coefficient estimate on *HIGHDEBTPCT* is significantly negative, consistent with inside debt lowering debtholders' concern of ex post expropriation as predicted in *Hypothesis 1*. In contrast, when the possibility of default is high (low Altman's Z-score), *HIGHDEBTPCT* is positively associated with covenant usage, suggesting that that debtholders (banks in particular) may be concerned about dilution of their claims when inside debt becomes very high, in borrowing firms with poor credit quality.

The indicator variable *HIGHDEBTPCT* is a noisy proxy for claim dilution potential of inside debt, since the features of deferred compensation contracts vary across firms. Given the lack of data to accurately capture the true seniority of inside debt, our results

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bankruptcy-protected form, etc. Since many of these features are not mandatory disclosure under the 2006 SEC rule, we do not incorporate them into the analysis due to lack of data availability.

[25] For brevity, we do not tabulate the results conditional on below-investment-grade S&P credit rating, which are qualitatively similar to those reported in Table 7 conditional on Altman's Z-score.

should be interpreted with caution. Furthermore, the claim dilution effect seems to exist only for a very small subsample within firms with high default risk. Overall, our preliminary evidence suggests that inside debt may not always serve the interests of outside debtholders, and that debtholders recognize this effect in designing covenants.

6.3 The effect of relative leverage on the design of public bond contracts

We now turn to examining the effect of CEO relative leverage on contracting in public debt. Similar to our analyses with private loan contracts, we expect a negative association between CEO relative leverage and the cost of public debt. However, the prediction on the effect of CEO relative leverage on covenant usage in public bonds is not as clear. Since public bondholders face considerable costs to monitoring covenants, public bond contracts typically do not include covenants to the same extent as private loan contracts (Bradley and Roberts 2004). Therefore, the effect of CEO relative leverage on covenant usage in public bonds could be weaker than in private loans.

We collect new bond issues by U.S. nonfinancial firms from the intersection of Compustat, FISD, and ExecuComp databases during 2006–2008. This yields a sample of 511 new bond issues. We estimate the following equation using ordinary least squares:

$$\begin{aligned} &COSTDEBT\_BOND_{i,t}\ (COVENANT\_BOND_{i,t}) \\ &= \alpha_0 + \alpha_1 RELATIVE\_LEV_{i,t} + + \alpha_2 \ln(TENURE)_{i,t} + \alpha_3 \ln(SALARY)_{i,t} + \alpha_4 \ln(BONUS)_{i,t} \\ &+ \alpha_5 DELTA_{i,t} + \alpha_6 VEGA_{i,t} + \alpha_7 \ln(AMOUNT)_{i,t} + \alpha_8 \ln(MATURITY)_{i,t} + \alpha_9 \ln(MVE)_{i,t-1} \\ &+ \alpha_{10} ROA_{i,t-1} + \alpha_{11} BM_{i,t-1} + \alpha_{12} LEV_{i,t-1} + \alpha_{13} TANGIBILITY_{i,t-1} + \alpha_{14} SIGMAOCF_{i,t-1} \\ &+ \alpha_{15} ALTMANZ_{i,t-1} + \text{Year fixed effects} + \text{Industry fixed effects} + \varepsilon_{i,t} \qquad (5) \end{aligned}$$

COSTDEBT_BOND is the cost of issuing bonds, measured as the difference between the yield of the benchmark treasury issue and the issue's offering yield (i.e., treasury spread), expressed in basis points scaled by 100. *COVENANT_BOND* measures covenant usage, defined as the total number of covenants in the bond contract[26]. *RELATIVE_LEV* and control variables are as defined in Eq. (1). The mean (median) treasury spread is 2.23% (1.80%), while the mean (median) issue has 4.94 (5) covenants.[27]

Table 8, column (1) shows that the coefficient estimate on *RELATIVE_LEV* is significantly negative when it is regressed on yield spread (*COSTDEBT_BOND*), indicating that higher relative leverage is associated with a lower cost of issuing new corporate bonds. These results complement the findings in the Wei and Yermack (2010) event study, by documenting a cross-sectional association between CEO relative leverage and the yield spread at the inception of the bond issue. Combined with our earlier findings, high CEO relative leverage appears to decrease the cost of debt financing in general, i.e., for both private loans and public bonds.

In Table 8, column (2), we find an insignificant estimate on *RELATIVE_LEV* when it is regressed on the number of covenant restrictions (*COVENANT_BOND*).[28] While this stands in contrast to our findings on private loans, it is consistent with public bondholders lacking the incentive and ability to effectively monitor borrowers through covenants (Rajan and Winton 1995, Bradley and Roberts 2004). These results also stand in contrast to Chava, Kumar and Warga (2010), who show that large pensions, relative to CEO total pay, are associated with more covenants in bond contracts. Our use of a larger and more

[26] We are unable to develop a contract strictness measure for public bonds following Murfin (2009) as the FISD database does not provide information on the allowable ratio for each covenant in bond agreements.
[27] Although the number of covenants in public bonds appears higher than the number of covenants in private loans in our reported summary statistics, the actual use of covenants is much more prevalent in private loans than public bonds. One reason for this discrepancy is that DealScan database only collects financial-related covenants (and one investment-related covenant) on private loans, while FISD database provides a much more comprehensive list of covenants including investment-related, payout-related, financing-related, and accounting-related restrictions.
[28] We follow Nikolaev (2010) to construct narrower covenant indices by grouping covenants into investment-related, payout-related, financing-related, and accounting-related restrictions, respectively. Results based on each category of covenant restrictions are qualitatively similar as those reported under Column (2), and hence omitted for brevity.

recent sample, a more general definition of debt-like compensation that includes both pensions and other deferred compensation, and a focus on CEO relative leverage as opposed to the level of CEO pension compensation could account for the difference in results. Collectively, the results reported in Table 8 suggest that public bondholders take into account CEO relative leverage when determining the pricing of bonds, but not necessarily while determining the usage of covenants.

6.4 Concurrent changes in accounting rules and compensation disclosures

Our sample period starts in 2006, when expanded SEC disclosure requirements went into effect. Concurrently, the Financial Accounting Standards Board's Statement of Financial Accounting Standards 158 *Employers' Accounting for Defined-benefit Pension and Other Postretirement Plans* became effective for fiscal years ended December 2006 and later. The new accounting standard requires full recognition on the balance sheet of all corporate defined-benefit pension liabilities, which were partially off-balance-sheet until then. Therefore, both balance-sheet recognition and expanded disclosure of deferred compensation could have heightened lenders' attention to debt-like compensation offered to the CEO since 2006. In addition, the years 2007 and after are marked by the financial crisis; we are unable to directionally predict its impact on our results. Nevertheless, we confirm that our results hold both for the pre- as well as post-crisis periods in our sample.

7. Conclusion

Top executives in the United States are commonly compensated with both equity and debt. While prior research has examined the incentive effects of equity-based compensation extensively, most academic work has ignored the incentive effects of debt-like compensation. The greater the ratio of CEO debt-to-equity compensation to corporate leverage, the more aligned the CEO's interests should be with debtholders vis-à-vis stockholders. If debtholders recognize these implications, we expect firms with higher CEO relative leverage to have lower cost of debt and fewer covenants restricting managers' activities after debt issuance.

Using a sample of 1,462 new private loan facilities issued during 2006-2008, we find that as CEO relative leverage increases, lenders charge a lower cost of debt financing and reduce the usage of covenants in loan contracts, especially in firms with high default risk. These results are consistent with CEO debt-like compensation reducing stockholder-debtholder conflicts, and with debtholders recognizing this alignment. We find that the negative relationship between CEO relative leverage and the cost of debt also holds with a sample of new public bond issues. However, CEO relative leverage does not seem to affect covenant usage in bond contracts, probably due to covenants being less valuable as a monitoring tool in public bond issues, compared to private loans.

Our study confirms that debt-like compensation is an important tool in the resolution of agency conflicts between stockholders and debtholders, and that debtholders incorporate incentive alignment effects into debt contracting. Future research may explore the relative effectiveness of various institutional forms of debt-like compensation (e.g. pensions, other deferred compensation schemes) in mitigating stockholder-debtholder agency conflicts.

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Appendix A. Variable Definitions

Variable	Definition
COSTDEBT	All-in-drawn spread expressed in basis points scaled by 100. All-in-drawn spread is the sum of upfront fee, spread over *LIBOR*, utilization fee, annual fee specified in a facility at the inception of the facility.
COVENANT	The sum of 17 restrictive covenants, with each covenant coded as 1 if it is present in a package and 0 otherwise, at the inception of the package.
RELATIVE_LEV	The ratio of CEO's inside leverage to firm leverage. Inside leverage is calculated as the sum of actuarial present value of pension and other deferred compensation divided by the sum of stock value, restricted stock value, and value of stock option holdings. Firm leverage is defined as the sum of long-term debt (DLTT) and debt in current liabilities (DLC) divided by market value of equity (CSHO×PRCC_F).
ln(*TENURE)*	Natural logarithm of 1 plus the CEO's tenure at a firm.
ln(*SALARY*)	Natural logarithm of 1 plus the CEO's salary.
ln(*BONUS*)	Natural logarithm of 1 plus the CEO's bonus.
DELTA	Change in stock and option value for a 1% change in stock price, scaled by annual total compensation (TDC1), with the numerator calculated following Core and Guay (2002).
VEGA	Change in option value for a 0.01 change in stock-return volatility, for the CEO's portfolio of options, calculated following Core and Guay (2002).
ln(*AMOUNT*)	Natural logarithm of a facility's amount.
ln(*MATURITY*)	Natural logarithm of a facility's maturity in months.
N_BANK	Number of lenders for a facility.
IB	Dummy variable that equals 1 if at least one of the lead lenders is investment bank for a facility and 0 otherwise.
USBANK	A dummy variable that equals 1 if at least one of the lead lenders is a U.S. bank for a facility and 0 otherwise.
FRBANK	A dummy variable that equals 1 if at least one of the lead lenders is a foreign bank for a facility and 0 otherwise.
ln(*MVE*)	Natural logarithm of borrowing firm's market value of equity (CSHO×PRCC_F).
ROA	Borrowing firm's return-on-assets ratio, calculated as income before extraordinary items (IB) scaled by the lagged total assets(AT).
BM	Borrowing firm's book-to-market ratio, calculated as book value of equity (CEQ) divided by market value of equity (CSHO×PRCC_F).
LEV	Borrowing firm's leverage ratio, calculated as the sum of [long-term debt (DLTT) and debt in current liabilities (DLC)] divided by total assets (AT).
TANGIBILITY	Borrowing firm's tangibility, measured as net property, plant, and equipment (PPENT) divided by total assets (AT).
SIGMAOCF	Standard deviation of borrowing firm's operating cash flows scaled by lagged total assets over the past five years (including the current year). Operating cash flow is defined as net operating cash flow (OANCF) minus extraordinary items and discontinued operations (XIDOC). XIDOC is adjusted following Hribar and Collins (2002).

ALTMANZ	Borrower's Altman's Z-score, calculated as [4.34 + 0.08×working capital(ACT-LCT) /total assets(AT) - 0.04×retained earnings (RE)/total assets + 0.1×earnings before interest and taxes (EBIT)/total assets + 0.22×market value of equity (CSHO×PRCC_F)/book value of total liabilities(LT) - 0.06×Sales(SALE)/total assets] for manufacturing firms following Hillegeist, Keating, Cram and Lundstedt (2004), and [6.56×working capital/total assets + 3.26×retained earnings/total assets + 6.72×earnings before interest and taxes /total assets + 1.05×book value of equity (CEQ)/book value of total liabilities] for non-manufacturing firms following Altman(2000).
COVENANT_STRICT	A measure of loan contract strictness, calculated for five major covenants (Min. EBITDA to Debt, Min. Interest Coverage, Max. Capex, Min. Net Worth, and Min. Current Ratio) following Murfin (2009).
COSTDEBT_BOND	The difference between the offering yield on the issue and the yield on the benchmark treasury issue, expressed in basis points scaled by 100.
COVENANT_BOND	The number of covenant restrictions in the bond contract (payout-, investment-, financing-, accounting-related and other restrictions). See Nikolaev (2010) for a complete description.

Appendix B. Types of covenant restrictions in private loan contracts

This panel lists the type and distribution of covenants in the sample of private loans.

Type of Covenant	Number (Percentage) of packages that contain the covenant
Max. Debt to EBITDA	501 (39.5%)
Min. Interest Coverage	355 (28.0%)
Min. Fixed Charge Coverage	194 (15.3%)
Max. Leverage ratio	169 (13.3%)
Max. Capex	102 (8.05%)
Min. Net Worth	76 (6.00%)
Max. Senior Debt to EBITDA	64 (5.05%)
Min. Current Ratio	28 (2.21%)
Min. EBITDA	27 (2.13%)
Min. Tangible Net Worth	25 (1.97%)
Max. Debt to Tangible Net Worth	14 (1.10%)
Min. Cash Interest Coverage	6 (0.47%)
Min. Debt Service Coverage	5 (0.39%)
Max. Debt to Equity	3 (0.24%)
Max. Senior Leverage	3 (0.24%)
Min. Quick Ratio	3 (0.24%)
Max. Loan to Value	0 (0.00%)

Table 1: Sample selection

Facilities retrieved from DealScan issued between January 1, 2006 and May 31, 2009	51,456
(-) Facilities of borrowing firms in DealScan that cannot be linked to Compustat	(32,072)
(-)Facilities of borrowing firms missing data in Compustat to compute control variables	(15,126)
(-) Facilities missing CEO compensation information, i.e., tenure, inside leverage, delta, vega	(2,528)
(-) Facilities missing loan characteristics, i.e., loan amount, maturity, number of lenders, lead lender type	(41)
(-) Facilities missing debt contracting variables, i.e., cost of debt and covenants	(182)
(-) Facilities of borrowing firms in financial industry (SIC 6000-6999)	(45)
Number of facilities used in Table 3 to examine the relation between relative leverage and cost of debt	**1,462**
Number of packages used in Table 3 to examine the relation between relative leverage and the strictness of debt covenants	**1,267**

Table 2: Descriptive statistics and correlations

Panel A: Descriptive statistics

Variable definitions are in Appendix A. To remove outliers, the distributions of *COSTDEBT*, *RELATIVE_LEV*, ln(*SALARY*), ln(*BONUS*), *DELTA*, *VEGA*, ln(*MVE*), *ROA*, *BM*, *LEV*, *TANGIBILITY*, *SIGMAOCF*, and *ALTMANZ* are winsorized at the 1% and 99% level.

Variable	N	Mean	Std Dev	5%	25%	Median	75%	95%
COSTDEBT	1,462	1.246	1.082	0.200	0.450	0.875	1.750	3.250
COVENANT	1,267	1.243	1.184	0.000	0.000	1.000	2.000	3.000
RELATIVE_LEV	1,462	1.287	3.452	0.000	0.019	0.331	1.090	5.014
ln(*TENURE)*	1,462	1.692	0.842	0.000	1.099	1.792	2.303	3.091
ln(*SALARY*)	1,462	6.717	0.402	5.994	6.465	6.746	6.999	7.322
ln(*BONUS*)	1,462	1.530	2.714	0.000	0.000	0.000	2.446	7.340
DELTA	1,462	0.122	0.209	0.009	0.026	0.054	0.122	0.513
VEGA	1,462	252.4	361.1	4.491	38.62	105.6	304.9	1,134
ln(*AMOUNT*)	1,462	10.64	1.331	17.37	18.83	19.67	20.62	21.68
ln(*MATURITY*)	1,462	3.813	0.654	2.485	3.871	4.094	4.094	4.382
N_BANK	1,462	10.10	8.162	1.000	5.000	8.000	14.00	25.00
IB	1,462	0.072	0.258	0.000	0.000	0.000	0.000	1.000
USBANK	1,462	0.859	0.348	0.000	1.000	1.000	1.000	1.000
FRBANK	1,462	0.200	0.400	0.000	0.000	0.000	0.000	1.000
ln(*MVE*)	1,462	8.163	1.516	5.860	7.099	8.022	9.237	10.95
ROA	1,462	0.072	0.063	-0.022	0.036	0.065	0.107	0.179
BM	1,462	0.424	0.230	0.123	0.256	0.381	0.557	0.842
LEV	1,462	0.244	0.150	0.003	0.129	0.234	0.343	0.524
TANGIBILITY	1,462	0.319	0.234	0.049	0.130	0.250	0.492	0.799
SIGMAOCF	1,462	0.043	0.033	0.010	0.020	0.034	0.056	0.111
ALTMANZ	1,462	3.735	2.114	0.513	2.093	3.935	4.968	7.155

Panel B: Correlation matrix of debt contracting variable and relative leverage

Variable definitions are provided in Appendix A. Pearson correlations are reported above the main diagonal and Spearman correlations are reported below the diagonal. *** (**) (*) indicates significance at 1% (5%) (10%) two-tailed level.

	COVENANT	*COSTDEBT*	*RELATIVE_LEV*
COVENANT		0.18***	**-0.13*****
COSTDEBT	0.29***		**-0.19*****
RELATIVE_LEV	**-0.20*****	**-0.42*****	

Table 3: Does CEO relative leverage affect cost of debt and covenant usage?

This table reports regression results on the relationship between CEO relative leverage and the design of private loan contracts (including cost of debt and number of restrictive covenants). Column (1) presents the ordinary least squares (OLS) regression results with cost of debt (*COSTDEBT*) as the dependent variable. Column (2) and column (3) present the ordinary least squares (OLS) regression results and ordered-probit regression results with number of restrictive covenants (*COVENANT*) as the dependent variable. Intercept terms in column (3) are not presented for parsimony. Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity and clustered by firm. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1)	(2)	(3)
	OLS	***OLS***	***Ordered-Probit***
Dependent Variable	*COSTDEBT*	*COVENANT*	*COVENANT*
RELATIVE_LEV	**-0.019***	**-0.018**	**-0.029**
	(0.007)	(0.008)	(0.012)
ln(*TENURE*)	**-0.029**	**0.062**	**0.068**
	(0.038)	(0.044)	(0.047)
ln(*SALARY*)	**0.162**	**-0.091**	**-0.060**
	(0.157)	(0.125)	(0.141)
ln(*BONUS*)	**0.002**	**-0.019***	**-0.028****
	(0.011)	(0.011)	(0.013)
DELTA	**-0.023**	**0.002**	**0.034**
	(0.112)	(0.156)	(0.171)
VEGA×1000	**0.014**	**-0.044**	**-0.129**
	(0.119)	(0.105)	(0.146)
ln(*AMOUNT*)	**-0.158*****	**0.026**	**0.038**
	(0.037)	(0.037)	(0.048)
ln(*MATURITY*)	**0.040**	**-0.039**	**-0.062**
	(0.051)	(0.050)	(0.060)
N_BANK	**-0.003**	**0.039*****	**0.046*****
	(0.004)	(0.004)	(0.005)
IB	**0.712*****	**0.199**	**0.227**
	(0.158)	(0.159)	(0.167)
USBANK	**-0.581*****	**-0.023**	**-0.012**
	(0.135)	(0.106)	(0.123)
FRBANK	**-0.023**	**-0.048**	**-0.072**
	(0.093)	(0.081)	(0.094)
ln(*MVE*)	**-0.151*****	**-0.378*****	**-0.451*****
	(0.051)	(0.046)	(0.059)
ROA	**-1.507***	**-0.801**	**-0.765**
	(0.780)	(0.727)	(0.741)
BM	**0.364****	**-0.425****	**-0.508*****

	(0.170)	(0.180)	(0.195)
LEV	**1.153*****	**-0.300**	**-0.392**
	(0.280)	(0.298)	(0.317)
TANGIBILITY	**0.153**	**-0.139**	**-0.182**
	(0.222)	(0.197)	(0.212)
SIGMAOCF	**3.507*****	**-0.195**	**0.074**
	(1.187)	(1.311)	(1.414)
ALTMANZ	**-0.020**	**0.030**	**0.026**
	(0.020)	(0.025)	(0.026)
Intercept	**4.058*****	**4.436*****	
	(1.027)	(0.930)	
Year fixed effects	Included	Included	Included
Industry fixed effects	Included	Included	Included
Number of observations	1,462	1,267	1,267
Adjusted R^2	0.402	0.290	0.127(Pseudo)

Table 4: Does CEO relative leverage affect cost of debt and covenant usage? Two-stage least squares estimation

Panel A: Using state individual tax rates as instrumental variable

This table reports regression results on the relationship between CEO relative leverage and the design of private loan contracts (including cost of debt and number of restrictive covenants). Columns (1.1) and (1.2) present the two-stage least squares (2SLS) regression results with cost of debt (*COSTDEBT*) as the dependent variable in the second-stage regression. Columns (2.1) and (2.2) present the two-stage least squares (2SLS) regression results with number of restrictive covenants (*COVENANT*) as the dependent variable in the second-stage regression. *TAXRATE_WAGE*, *TAXRATE_GAIN*, *TAXRATE_MORT* are the maximum tax rate for wage, maximum tax rate for long term capital gains, and maximum mortgage subsidy rate faced by a CEO in the state where her firm is headquartered, respectively. These rates are calculated using TAXSIM model (See http://www.nber.org/~taxsim/state-rates/ and Feenberg and Coutts (1993) for a complete description). Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1.1)	(1.2)	(2.1)	(2.2)
	First-stage	***Second-stage***	***First-stage***	***Second-stage***
Dependent Variable	*RELATIVE_LEV*	*COSTDEBT*	*RELATIVE_LEV*	*COVENANT*
TAXRATE_WAGE	**0.285****		**0.316****	
	(0.128)		(0.147)	
TAXRATE_GAIN	**-0.073**		**-0.064**	
	(0.119)		(0.129)	
TAXRATE_MORT	**-0.219*****		**-0.281*****	
	(0.058)		(0.073)	
FIT_ RELATIVE_LEV		**-0.158*****		**-0.134****
		(0.063)		(0.060)
ln(*TENURE*)	**-0.011**	**-0.032**	**-0.047**	**0.057**
	(0.085)	(0.029)	(0.100)	(0.044)
ln(*SALARY*)	**-0.540***	**0.105**	**-0.603***	**-0.138**
	(0.281)	(0.108)	(0.346)	(0.127)
ln(*BONUS*)	**-0.071****	**-0.006**	**-0.083****	**-0.028****
	(0.030)	(0.009)	(0.036)	(0.012)
DELTA	**-2.081*****	**-0.307****	**-2.341*****	**-0.274**
	(0.310)	(0.151)	(0.360)	(0.204)
VEGA×1000	**0.463**	**0.079**	**0.443**	**0.010**
	(0.501)	(0.114)	(0.536)	(0.110)
ln(*AMOUNT*)	**-0.050**	**-0.165*****	**-0.008**	**0.024**
	(0.072)	(0.031)	(0.112)	(0.037)
ln(*MATURITY*)	**0.026**	**0.045**	**0.002**	**-0.035**
	(0.154)	(0.051)	(0.176)	(0.049)

N_BANK	**-0.020**	**-0.006**	**-0.014**	**0.038***
	(0.012)	(0.004)	(0.017)	(0.005)
IB	**-0.555***	**0.641***	**-0.441**	**0.154**
	(0.214)	(0.127)	(0.293)	(0.154)
USBANK	**0.368**	**-0.528***	**0.342**	**0.019**
	(0.174)	(0.109)	(0.254)	(0.106)
FRBANK	**-0.377**	**-0.072**	**-0.291**	**-0.080**
	(0.190)	(0.073)	(0.247)	(0.084)
ln(*MVE*)	**0.532***	**-0.080**	**0.557***	**-0.317***
	(0.155)	(0.049)	(0.183)	(0.053)
ROA	**-0.178**	**-1.587**	**-1.756**	**-1.026**
	(1.920)	(0.620)	(2.445)	(0.725)
BM	**-0.189**	**0.309**	**-0.161**	**-0.470**
	(0.429)	(0.140)	(0.524)	(0.182)
LEV	**-2.950***	**0.722**	**-3.957***	**-0.785**
	(0.761)	(0.282)	(0.971)	(0.387)
TANGIBILITY	**0.982**	**0.213**	**0.797**	**-0.125**
	(0.426)	(0.156)	(0.583)	(0.202)
SIGMAOCF	**-1.260**	**3.355***	**-0.261**	**-0.244**
	(3.456)	(0.986)	(4.125)	(1.261)
ALTMANZ	**0.164***	**0.001**	**0.274**	**0.059**
	(0.086)	(0.023)	(0.110)	(0.028)
Intercept	**1.805**	**4.304***	**1.451**	**4.568***
	(2.440)	(0.799)	(3.150)	(0.907)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
Number of	1,460	1,460	1,265	1,265
Adjusted R^2	0.139	0.231	0.149	0.160

Table 4: Does CEO relative leverage affect cost of debt and covenant usage? Two-stage least squares estimation (Cont'd)

Panel B: Using industry median relative leverage as instrumental variable

This table reports regression results on the relationship between CEO relative leverage and the design of private loan contracts (including cost of debt and number of restrictive covenants). Columns (1.1) and (1.2) present the two-stage least squares (2SLS) regression results with cost of debt (*COSTDEBT*) as the dependent variable in the second-stage regression. Columns (2.1) and (2.2) present the two-stage least squares (2SLS) regression results with number of restrictive covenants (*COVENANT*) as the dependent variable in the second-stage regression. *IND_RELATIVE_LEV* is the median value of *RELATIVE_LEV* calculated for each year-industry with at least 5 observations. Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1.1)	(1.2)	(2.1)	(2.2)
	First-stage	***Second-stage***	***First-stage***	***Second-stage***
Dependent Variable	*RELATIVE_LEV*	*COSTDEBT*	*RELATIVE_LEV*	*COVENANT*
IND_RELATIVE_LEV	**1.255*****		**1.023*****	
	(0.254)		(0.255)	
FIT_ RELATIVE_LEV		**-0.221*****		**-0.269****
		(0.083)		(0.132)
ln(*TENURE*)	**0.033**	**-0.004**	**-0.014**	**0.073**
	(0.065)	(0.032)	(0.070)	(0.049)
ln(*SALARY*)	**0.075**	**0.140**	**0.048**	**-0.118**
	(0.157)	(0.116)	(0.196)	(0.134)
ln(*BONUS*)	**-0.054*****	**-0.008**	**-0.050****	**-0.031****
	(0.016)	(0.011)	(0.020)	(0.014)
DELTA	**-1.387*****	**-0.280***	**-1.448*****	**-0.282**
	(0.186)	(0.163)	(0.198)	(0.256)
VEGA×1000	**0.195**	**-0.085**	**-0.092**	**-0.097**
	(0.234)	(0.101)	(0.257)	(0.110)
ln(*AMOUNT*)	**-0.003**	**-0.155*****	**-0.019**	**0.005**
	(0.041)	(0.033)	(0.061)	(0.040)
ln(*MATURITY*)	**0.046**	**0.069**	**0.069**	**-0.009**
	(0.072)	(0.053)	(0.082)	(0.055)
N_BANK	**-0.014****	**-0.010*****	**-0.009**	**0.038*****
	(0.007)	(0.004)	(0.009)	(0.005)
IB	**-0.315**	**0.738*****	**-0.046**	**0.200**
	(0.192)	(0.144)	(0.260)	(0.175)
USBANK	**0.229**	**-0.520*****	**0.322****	**0.100**
	(0.140)	(0.117)	(0.161)	(0.123)
FRBANK	**-0.020**	**-0.031**	**-0.038**	**-0.046**

	(0.141)	(0.079)	(0.165)	(0.095)
ln(*MVE*)	**0.182****	**-0.090****	**0.275*****	**-0.282*****
	(0.075)	(0.040)	(0.088)	(0.058)
ROA	**1.802***	**-1.544****	**1.279**	**-0.444**
	(1.077)	(0.650)	(1.316)	(0.777)
BM	**-0.074**	**0.337****	**-0.079**	**-0.317**
	(0.218)	(0.144)	(0.239)	(0.198)
LEV	**-1.485*****	**0.867*****	**-1.505*****	**-0.566**
	(0.363)	(0.251)	(0.423)	(0.385)
TANGIBILITY	**0.624****	**0.302**	**0.470**	**-0.132**
	(0.306)	(0.189)	(0.366)	(0.231)
SIGMAOCF	**1.049**	**3.502*****	**1.293**	**-0.121**
	(2.143)	(1.101)	(2.612)	(1.439)
ALTMANZ	**0.073***	**-0.017**	**0.110****	**0.053***
	(0.040)	(0.019)	(0.045)	(0.032)
Intercept	**-1.877***	**3.822*****	**-1.999**	**4.283*****
	(1.068)	(0.818)	(1.493)	(0.989)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
Number of	1,239	1,239	1,073	1,073
Adjusted R^2	0.168	0.368	0.160	0.172

Table 5: CEO relative leverage and debt contracting: the effect of firm default risk

Panel A: Subsample tests partitioned by Altman's Z-score

This table reports the ordinary least squares (OLS) regression results on the relationship between CEO relative leverage and the design of private loan contracts (including cost of debt and number of restrictive covenants), conditional on the level of Altman's Z-score. Median Altman's Z-scores are calculated separately for manufacturing and non-manufacturing firms in the sample. Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity and clustered by firm. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1)	(2)	(3)	(4)
	Altman's Z-Score below Median (Closer to default)		*Altman's Z-score at or above Median (further from default)*	
Dependent Variable	*COSTDEBT*	*COVENANT*	*COSTDEBT*	*COVENANT*
RELATIVE_LEV	**-0.036*****	**-0.040****	**-0.013****	**-0.009**
	(0.014)	(0.017)	(0.006)	(0.008)
ln(*TENURE*)	**-0.036**	**0.162*****	**0.010**	**-0.036**
	(0.042)	(0.061)	(0.053)	(0.063)
ln(*SALARY*)	**0.272****	**-0.165**	**-0.103**	**-0.063**
	(0.120)	(0.160)	(0.199)	(0.185)
ln(*BONUS*)	**0.000**	**-0.018**	**-0.002**	**-0.014**
	(0.011)	(0.016)	(0.016)	(0.016)
DELTA	**-0.106**	**-0.190**	**-0.060**	**0.304**
	(0.178)	(0.200)	(0.157)	(0.229)
VEGA×1000	**-0.197**	**0.033**	**0.170**	**-0.000**
	(0.122)	(0.151)	(0.174)	(0.140)
ln(*AMOUNT*)	**-0.141*****	**-0.040**	**-0.155****	**0.082**
	(0.032)	(0.052)	(0.062)	(0.056)
ln(*MATURITY*)	**0.016**	**-0.062**	**0.004**	**-0.021**
	(0.052)	(0.072)	(0.069)	(0.063)
N_BANK	**-0.008****	**0.037*****	**0.007**	**0.046*****
	(0.004)	(0.005)	(0.008)	(0.008)
IB	**0.651*****	**-0.071**	**0.721****	**0.425***
	(0.121)	(0.218)	(0.282)	(0.242)
USBANK	**-0.634*****	**0.079**	**-0.488****	**-0.169**
	(0.103)	(0.161)	(0.189)	(0.148)
FRBANK	**-0.061**	**0.056**	**-0.082**	**-0.196**
	(0.081)	(0.098)	(0.166)	(0.140)
ln(*MVE*)	**-0.123*****	**-0.315*****	**-0.147****	**-0.469*****
	(0.043)	(0.055)	(0.068)	(0.073)
ROA	**-2.098*****	**-0.514**	**-0.389**	**-1.817***
	(0.689)	(0.977)	(1.240)	(1.087)

BM	**0.286***	**-0.179**	**0.525**	**-0.901*****
	(0.150)	(0.233)	(0.333)	(0.294)
LEV	**1.336*****	**-0.077**	**0.647**	**-0.556**
	(0.263)	(0.434)	(0.507)	(0.460)
TANGIBILITY	**0.283**	**-0.215**	**-0.347**	**-0.058**
	(0.188)	(0.285)	(0.278)	(0.276)
SIGMAOCF	**0.545**	**-0.293**	**5.724*****	**-0.155**
	(1.118)	(2.114)	(1.638)	(1.628)
ALTMANZ	**-0.070***	**0.001**	**-0.065***	**0.048**
	(0.040)	(0.058)	(0.034)	(0.039)
Intercept	**3.148*****	**5.589*****	**5.854*****	**4.169*****
	(0.867)	(1.260)	(1.405)	(1.423)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
Number of observations	733	632	729	635
Adjusted R^2	0.474	0.284	0.386	0.330

Table 5: CEO relative leverage and debt contracting: the effect of firm default risk (Cont'd)

Panel B: Subsample tests partitioned by firm credit rating

This table reports the ordinary least squares (OLS) regression results on the relationship between CEO relative leverage and the design of private loan contracts (including cost of debt and number of restrictive covenants), conditional on S&P credit ratings. Investment grade rating is defined as S&P credit ratings at or above BBB-. Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity and clustered by firm. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1)	(2)	(3)	(4)
	Below Investment Grade (Closer to default)		*At or Above Investment Grade (further from default)*	
Dependent Variable	*COSTDEBT*	*COVENANT*	*COSTDEBT*	*COVENANT*
RELATIVE_LEV	**-0.114****	**-0.055****	**-0.007***	**-0.006**
	(0.054)	(0.024)	(0.004)	(0.009)
ln(*TENURE*)	**-0.062**	**0.154**	**-0.023**	**-0.016**
	(0.063)	(0.103)	(0.034)	(0.047)
ln(*SALARY*)	**0.090**	**-0.015**	**0.283****	**-0.002**
	(0.177)	(0.287)	(0.118)	(0.120)
ln(*BONUS*)	**-0.023**	**-0.028**	**0.006**	**-0.012**
	(0.019)	(0.031)	(0.013)	(0.012)
DELTA	**-0.461***	**-0.328**	**0.112**	**0.188**
	(0.245)	(0.301)	(0.086)	(0.159)
VEGA×1000	**0.650****	**0.215**	**-0.009**	**0.103**
	(0.322)	(0.483)	(0.097)	(0.114)
ln(*AMOUNT*)	**-0.075**	**0.032**	**-0.234*****	**0.027**
	(0.051)	(0.106)	(0.048)	(0.039)
ln(*MATURITY*)	**-0.223****	**0.139**	**0.008**	**-0.049**
	(0.091)	(0.138)	(0.042)	(0.046)
N_BANK	**-0.010***	**0.035*****	**0.003**	**0.040*****
	(0.006)	(0.010)	(0.004)	(0.004)
IB	**0.579*****	**-0.060**	**0.901***	**-0.342**
	(0.156)	(0.247)	(0.459)	(0.222)
USBANK	**-0.437*****	**0.261**	**-0.489*****	**-0.256***
	(0.145)	(0.218)	(0.184)	(0.147)
FRBANK	**-0.155**	**0.065**	**-0.005**	**-0.214*****
	(0.128)	(0.197)	(0.090)	(0.077)
ln(*MVE*)	**-0.261*****	**-0.357*****	**0.009**	**-0.386*****
	(0.083)	(0.126)	(0.045)	(0.044)
ROA	**-2.558*****	**-0.696**	**-0.406**	**-0.206**

	(0.935)	(1.211)	(0.869)	(1.029)
BM	**-0.164**	**-0.063**	**0.734***	**-0.164**
	(0.247)	(0.386)	(0.252)	(0.232)
LEV	**0.305**	**-0.417**	**1.213***	**-0.185**
	(0.420)	(0.595)	(0.388)	(0.450)
TANGIBILITY	**0.260**	**-0.162**	**0.155**	**-0.143**
	(0.284)	(0.415)	(0.195)	(0.232)
SIGMAOCF	**-0.525**	**0.425**	**0.659**	**1.030**
	(1.664)	(2.599)	(1.439)	(1.699)
ALTMANZ	**0.008**	**0.118***	**0.019**	**-0.052**
	(0.044)	(0.065)	(0.021)	(0.034)
Intercept	**6.035***	**2.246**	**2.623***	**4.155***
	(1.445)	(2.420)	(1.010)	(1.045)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
Number of observations	434	313	575	566
Adjusted R^2	0.321	0.207	0.420	0.390

Table 6: Does CEO relative leverage affect loan contract strictness?

This table reports regression results on the relationship between CEO relative leverage and the loan contract strictness. Column (1) presents the ordinary least squares (OLS) regression results using pooling sample with *COVENANT_STRICT* as the dependent variable. Column (2) and column (3) present the ordinary least squares (OLS) regression results with *COVENANT_STRICT* as the dependent variable, conditional on the level of Altman's Z-score. Median Altman's Z-scores are calculated separately for manufacturing and non-manufacturing firms in the sample. *COVENANT_STRICT* is a measure of loan contract strictness, constructed following Murfin (2009). Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity and clustered by firm. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1) *Pooling Sample*	(2) *Altman's Z-Score below Median (Closer to default)*	(3) *Altman's Z-score at or above Median (further from default)*
Dependent Variable	*COVENANT_STRICT*	*COVENANT_STRICT*	*COVENANT_STRICT*
RELATIVE_LEV	**-0.005***	**-0.015****	**-0.001**
	(0.003)	(0.007)	(0.003)
ln(*TENURE*)	**-0.013**	**0.011**	**-0.040**
	(0.020)	(0.030)	(0.027)
ln(*SALARY*)	**0.025**	**-0.049**	**0.046**
	(0.050)	(0.076)	(0.067)
ln(*BONUS*)	**0.001**	**-0.002**	**0.001**
	(0.005)	(0.007)	(0.007)
DELTA	**0.057**	**0.031**	**0.052**
	(0.067)	(0.106)	(0.096)
VEGA×1000	**0.029**	**-0.003**	**-0.011**
	(0.052)	(0.080)	(0.057)
ln(*AMOUNT*)	**0.010**	**-0.011**	**0.017**
	(0.015)	(0.022)	(0.022)
ln(*MATURITY*)	**0.014**	**0.023**	**-0.001**
	(0.020)	(0.025)	(0.029)
N_BANK	**0.013*****	**0.012*****	**0.017*****
	(0.002)	(0.003)	(0.003)
IB	**0.010**	**0.020**	**0.004**
	(0.062)	(0.089)	(0.095)
USBANK	**0.100****	**0.140***	**0.044**
	(0.046)	(0.072)	(0.065)
FRBANK	**0.022**	**0.062**	**0.017**
	(0.039)	(0.053)	(0.060)
ln(*MVE*)	**-0.132*****	**-0.111*****	**-0.135*****
	(0.020)	(0.029)	(0.027)
ROA	**0.292**	**0.546**	**0.140**

	(0.338)	(0.572)	(0.473)
BM	**-0.258*****	**-0.273****	**-0.154**
	(0.085)	(0.113)	(0.137)
LEV	**0.180**	**-0.049**	**0.426****
	(0.134)	(0.199)	(0.200)
TANGIBILITY	**-0.284*****	**-0.016**	**-0.042**
	(0.081)	(0.145)	(0.145)
SIGMAOCF	**-0.941***	**-1.124**	**-0.871**
	(0.540)	(0.993)	(0.662)
ALTMANZ	**-0.014**	**-0.002**	**-0.032***
	(0.011)	(0.030)	(0.017)
Intercept	**2.056*****	**2.934*****	**1.664*****
	(0.381)	(0.590)	(0.550)
Year fixed effects	Included	Included	Included
Industry fixed effects	Included	Included	Included
Number of	1,061	531	530
Adjusted R^2	0.218	0.259	0.238

Table 7: Does inside debt create claim dilution?

This table reports the ordinary least squares (OLS) regression results on the relationship between CEO relative leverage and the design of private loan contracts (including cost of debt and number of restrictive covenants), conditional on the level of Altman's Z-score. Median Altman's Z-scores are calculated separately for manufacturing and non-manufacturing firms in the sample. *HIGHDEBTPCT* is an indicator variable that equals 1 if the inside debt-to-corporate debt ratio lies above the 95th percentile of the annual in-sample distribution and 0 otherwise. Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity and clustered by firm. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1)	(2)	(3)	(4)
	Altman's Z-score below Median (Closer to default)		*Altman's Z-score at or above Median (further from default)*	
Dependent Variable	*COSTDEBT*	*COVENANT*	*COSTDEBT*	*COVENANT*
RELATIVE_LEV	**-0.039****	**-0.065*****	**-0.007**	**0.004**
	(0.017)	(0.019)	(0.007)	(0.008)
HIGHDEBTPCT	**0.089**	**0.678****	**-0.195**	**-0.501*****
	(0.243)	(0.336)	(0.145)	(0.155)
ln(*TENURE*)	**-0.037**	**0.148****	**0.019**	**-0.025**
	(0.042)	(0.061)	(0.053)	(0.063)
ln(*SALARY*)	**0.271****	**-0.174**	**-0.080**	**-0.001**
	(0.120)	(0.158)	(0.199)	(0.186)
ln(*BONUS*)	**-0.000**	**-0.020**	**-0.002**	**-0.015**
	(0.011)	(0.016)	(0.016)	(0.016)
DELTA	**-0.108**	**-0.207**	**-0.058**	**0.325**
	(0.178)	(0.198)	(0.157)	(0.229)
VEGA×1000	**-0.197**	**0.025**	**0.168**	**0.005**
	(0.122)	(0.147)	(0.172)	(0.139)
ln(*AMOUNT*)	**-0.141*****	**-0.037**	**-0.155****	**0.077**
	(0.032)	(0.052)	(0.062)	(0.055)
ln(*MATURITY*)	**0.016**	**-0.064**	**0.005**	**-0.010**
	(0.052)	(0.072)	(0.069)	(0.062)
N_BANK	**-0.008****	**0.037*****	**0.007**	**0.047*****
	(0.004)	(0.005)	(0.008)	(0.007)
IB	**0.654*****	**-0.043**	**0.724****	**0.451***
	(0.121)	(0.218)	(0.281)	(0.243)
USBANK	**-0.634*****	**0.081**	**-0.489****	**-0.159**
	(0.103)	(0.161)	(0.191)	(0.149)
FRBANK	**-0.059**	**0.059**	**-0.081**	**-0.180**
	(0.082)	(0.100)	(0.166)	(0.141)
ln(*MVE*)	**-0.122*****	**-0.305*****	**-0.158****	**-0.499*****
	(0.043)	(0.055)	(0.070)	(0.075)

ROA	**-2.111***	**-0.595**	**-0.390**	**-1.858***
	(0.690)	(0.980)	(1.237)	(1.071)
BM	**0.286***	**-0.184**	**0.537**	**-0.916***
	(0.150)	(0.231)	(0.338)	(0.290)
LEV	**1.341***	**-0.032**	**0.619**	**-0.610**
	(0.264)	(0.432)	(0.509)	(0.459)
TANGIBILITY	**0.289**	**-0.202**	**-0.339**	**-0.022**
	(0.188)	(0.289)	(0.279)	(0.273)
SIGMAOCF	**0.579**	**-0.138**	**5.632***	**-0.246**
	(1.122)	(2.122)	(1.640)	(1.589)
ALTMANZ	**-0.068***	**0.011**	**-0.064***	**0.052**
	(0.040)	(0.058)	(0.034)	(0.039)
Intercept	**3.143***	**5.506***	**5.783***	**4.021***
	(0.868)	(1.252)	(1.402)	(1.410)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
Number of observations	733	632	729	635
Adjusted R^2	0.474	0.290	0.387	0.338

Table 8: Does CEO relative leverage affect cost of debt and covenant usage in public bonds?

Column (1) presents the ordinary least squares (OLS) regression results with bond yield spread (*COSTDEBT_BOND*) as the dependent variable. Column (2) presents the ordinary least squares (OLS) regression results with the number of restrictive covenants in bond contracts (*COVENANT_BOND*) as the dependent variable. Industry fixed effects are based on Fama-French 12 industry-dummy. Definitions of all other variables are listed in Appendix A. The coefficient estimates on *VEGA* are multiplied by 1000 for ease of presentation. Robust standard errors are reported in parentheses below their coefficient estimates, adjusted for heteroskedasticity and clustered by firm. *** (**) (*) indicates significance at 1% (5%) (10%) two tailed level, respectively.

	(1)	(2)
Dependent Variable	*COSTDEBT_BOND*	*COVENANT_BOND*
RELATIVE_LEV	**-0.069*****	**-0.029**
	(0.023)	(0.080)
ln(*TENURE*)	**-0.015**	**0.190**
	(0.101)	(0.249)
ln(*SALARY*)	**0.171***	**0.260**
	(0.093)	(0.258)
ln(*BONUS*)	**-0.049****	**-0.056**
	(0.019)	(0.071)
DELTA	**-0.132**	**-0.290**
	(0.082)	(0.271)
VEGA×1000	**-0.194**	**-0.486**
	(0.203)	(0.447)
ln(*AMOUNT*)	**0.651***	**-3.759****
	(0.365)	(1.682)
ln(*MATURITY*)	**-0.136**	**0.083**
	(0.0938)	(0.166)
ln(*MVE*)	**-0.214****	**0.097**
	(0.083)	(0.203)
ROA	**-2.367**	**5.556**
	(1.806)	(8.534)
BM	**-0.314**	**-0.929**
	(0.454)	(1.848)
LEV	**0.558**	**2.467**
	(0.713)	(2.198)
TANGIBILITY	**0.180**	**0.261**
	(0.3741)	(1.002)
SIGMAOCF	**4.679*****	**-13.465****
	(1.574)	(6.114)
ALTMANZ	**-0.026**	**0.027**
	(0.068)	(0.216)
Intercept	**-1.399**	**28.446**
	(2.689)	(14.158)

Year fixed effects	Included	Included
Industry fixed effects	Included	Included
Number of observations	502	502
Adjusted R^2	0.368	0.142