Covenant Protection, Credit Spread Dynamics and Managerial Incentives*

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Abstract

Covenants can be viewed as governance mechanism that gives control protection to debtholders. We construct a Covenant Protection Index for a large sample of public bonds and investigate:(1) the impact of covenant protection on the credit spread dynamics; (2) the role of covenant protection in mitigating managerial risk-shifting. We first document that credit spreads are decreasing in the strength of covenant protection. The credit spreads of bonds with minimum and maximum protection can differ by 141 basis points. We conduct novel analysis including a matching technique and other tests to address the issue of endogeneity. Secondly, we study the ex post effectiveness of covenant protection during industry-level and economy-wide negative shocks. Under the exogenous shocks, bonds with strong protection experience significantly less or no value loss. Finally, we document that higher CEO risk-taking incentive (measured by Vega) is associated with *higher* credit spreads for bonds with weak protection. For bonds with strong protection, higher Vega is associated with *lower* credit spreads.

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1 Introduction

Corporate governance is concerned with mechanisms by which capital suppliers exercise control over corporate insiders and management to protect their investment. Since the work of Jensen and Meckling (1976) and Smith and Warner (1979), the economics of the conflicts between bondholders and shareholders are well understood. These conflicts arise when the firm unexpectedly increases cash flow distributions as dividends or repurchases, when the issuer redistributes assets after debt issuance, or via debt refinancing at a similar or higher priority, among other sources. For creditors, bond covenants provide the major form of protection from these conflicts. There are well over 40 different types of covenants used in practice, with some bond issues using just a few and others employing as many as a dozen. Popular examples of covenants include negative pledge covenants (which restrict issuing secured debt), restrictions of dividend payments, and asset sale clauses (which often require the issuer to redeem the bonds back upon the sale of certain assets).

In equilibrium, the benefit of adding a particular covenant should be offset by the cost of the covenant (see, e.g., Smith and Warner (1979)). Given the prevalence of covenants in the bond indenture and their theoretical cost–benefit tradeoff, it is surprising how few attempts there have been in the literature to empirically measure their impact on the dynamics of bond prices.[1,2] Our paper contributes to this literature by presenting a detailed analysis of the effect of bond covenants on the pricing of bonds and measuring their ex post success at protecting bondholders. It also examines the effectiveness of bond covenants in mitigating the managerial incentives for risk-shifting (Jensen and Meckling (1976)).

In particular, we first address the following empirical questions: (1) Does credit spread dynamics reflect the impact of contractual protection? (2) Do covenants protect bondholders when bad states emerge? In the absence of information frictions, bond covenants are chosen to protect bondholders from the expropriation of shareholder. Since fewer covenants imply more potential for shareholders to expropriate bondholder wealth, bondholders require a higher yield to hold such bonds in equilibrium. Ceteris paribus, the bond yield should be decreasing in the degree of protection provided by the covenant structure of a bond issue.

With respect to the former question, we provide several contributions. First, we document a significant negative relation between credit spreads and the degree of covenant protection, controlling for the issuer and particular bond issue characteristics. For example, the empirical model estimates the credit spread difference between a bond with minimum and maximum

[1] Goyal (2004), Bradley and Robert (2004), Chava, Kumar and Warga (2004) and Reisel (2004) document that, at issuance time, a negative relation exists between the presence of a covenant and the promised yield. The evidence is found in both private debt contracts (Bradley and Robert (2004)) and public bond contracts (the other three).

[2] Evidence for the ex post effectiveness of covenants in corporate events comes from Asquith and Wizman (1990), Crabbe (1991), Cook and Easterwood (1994) and Masulis (1980), among others.

protection to be in the range of 118 to 141 basis points (bp). Second, in order to perform this analysis, we develop issue-level protection indices that help provide a "score" for each bond issue. These scores are estimated from a comprehensive dataset on covenants and are based on either (i) the total number of covenants in each contract (see, e.g., Gompers, Ishii and Metrick (2003)), (ii) the categorization of conflicts addressed by covenants in Smith and Warner (1979), or (iii) an estimated "yield impact"–weighted measure of all the covenants.

Finally, we provide a novel analysis of how to address the endogeneity problem between yields and covenants at issuance, i.e., the tendency for high-yield firms to have both higher yields and more covenants due to the riskiness of their debt. Specifically, we analyze the relation between bond yields and our covenant score in the post-issuance period and for a matched sample of bonds in the same firm with different numbers of covenants. With respect to the latter case, the spread difference between the less protected and more highly protected bond is as large as 91 bp. Overall, the results complement the "qualitative"evidence in Smith and Warner (1979) by providing the first systematic quantitative evidence that bond covenants substantially lower yields.

With respect to whether covenants ex post protect bondholders, that is, whether the lower yield is justified, we look at two types of negative shocks that are exogenous to the issuer. Motivated by the structural model of bond pricing (e.g., Merton (1974)), we use (i) industry-wide stock price drops to identify sudden jumps in credit risk, and (ii) the economy-wide shock generated from the events of "9/11". We show that, under these types of negative shocks, the value loss is much less severe for bonds with higher protection; in particular, the jump in credit spreads of bonds with maximum protection is between 44 to 49 bp less than that of bonds with minimum protection.

Aside from minimizing wealth transfers from bondholders to shareholders, bond covenants may also have an indirect impact on firm value through their effect on corporate governance mechanisms. Agency theories suggest that, while aligning managers more closely with shareholders may help solve the shareholder–manager conflicts, the shareholder–debtholder conflicts may be exacerbated.[3] For example, incentivized CEO can increase shareholder value either by accepting positive NPV risky projects, or by risk shifting – accepting negative NPV risky projects to transfer wealth from senior claimholders to shareholders. To the extent that covenants protect bondholders by restricting the manager's risk-shifting decisions, covenants may act as an incentive–compatible mechanism to increase the firm value. On the other hand, covenants might be over-restrictive and therefore limit the managerial flexibility of taking positive NPV risky projects. To gauge which of these effects may dominate, we can analyze how covenant protection interacts with corporate governance mechnisms designed for solving the shareholder-managerial agency conflicts.

[3] See Jensen and Meckling (1976) and Smith and Warner (1979). John and John (1993) are the first to explicitly model this effect in the context of design of CEO compensation.

In particular, we study the interaction between a bond issue's covenant score and the managerial incentives provided by CEO compensation. Previous empirical research find that higher CEO incentives are associated with higher yields of the issuers' public bonds (see, i.e., DeFusco, Johnson and Zorn (1990), Bagnani, Milonas, Saunders and Travlos (1994), and Daniel, Martin and Naveen (2004)). We extend this literature by considering the role of covenant protection in mitigating the potential conflicts associated with higher CEO risk-taking incentive. We find that, consistent with recent findings, higher CEO risk-taking incentive is associated with higher credit spreads for bonds with low protection. Contrary to existing evidence, however, higher CEO risk-taking incentive is associated with lower credit spreads for bonds with high protection. To the extent that higher CEO risk-taking incentive results in increased risk taking of the firm (Coles, Daniel and Naveen (2005)), and that the risk-taking decisions may reflect incentives for either taking positive NPV projects, risk shifting or both, our findings suggest that managerial incentives and covenant protection could complement each other in enhancing the firm value. Our suggestive evidence is consistent with the view of the "interdependence of contracts comprising the firm" of Smith and Warner (1979) and the "nexus of contracts" view of Jensen and Meckling (1976).

This paper is organized as follows. Section II provides a review of the existing literature and relevant theories as they pertain to the presence of bond covenants. Section III describes the data to be used in the study, with a particular emphasis on the construction of the protection indices and the covenant scores for each bond issue. Section IV presents the main evidence in the paper, relating the impact of covenant protection on bond pricing and exogenous shocks to credit risk. In Section V we study the interaction of bond covenants with managerial incentives. Section VI offers conclusions.

2 Institutional Background and Existing Research

2.1 Institutional Background

Written in the debt indenture, covenants are the most important governance mechanism for U.S. creditors.[4] According to Lehn and Poulsen (1991), the corporation's obligation to debtholders is "contained exclusively in the bond contract". In legal practice, U.S. courts have generally maintained that the stockholder-debtholder conflicts should be resolved explicitly in bond contracts.

[4] Amihud, Garbade and Kahan (1999) list possible mechanisms for companies in other countries.

2.1.1 Types of Covenants

Academic researchers and capital market participants have long recognized the potential conflict between the shareholders and senior claimholders under certain situation, and the incentives of manager to act in the interests of shareholders when such situations emerge (See, e.g., Jensen and Meckling (1976) and extension by Myers (1977) and Smith and Warner (1979)). These actions include, but are not limited to, *Dividend payment* (unexpectedly raising dividend (or repurchasing shares at a premium)), *Claim dilution* (unexpectedly issuing debt of equal or higher priority), *Asset substitution* (accepting projects that are more risky than had been anticipated by debtholders), *Underinvestment* (foregoing a positive NPV project when benefits from accepting it accrues to the debtholders).

Covenants are chosen to control the shareholder-debtholder conflicts. We briefly describe below the major categories discussed in previous literature.[5]

Production/Investment Covenants: Possible direct restrictions of the firm's production/ investment decision include restrictions on investment, the sale of assets and on mergers. In addition, debtholders can require the contract to be secured by certain assets, or require the firm to take certain actions for the maintenance of the assets.

Dividend Covenants: Debt covenants frequently restrict not only the payment of cash dividends, other forms of distributions such as repurchase.[6] Myers (1977) points out that dividend covenants help solve the underinvestment problem.

Financing Covenants: To prevent claim dilution, purchasers of the current bond issue can require restrictions that limit either any future debt issuance or the seniority of the debt to be issued in the future. For example, the Negative Pledge Covenant, prohibits the firm from issuing secured debt unless the current issue is secured on a pari passu basis.

Bonding Covenants: Bonding activities are "expenditures made by the firm which control the bondholder-stockholder conflict" (Smith and Warner (1979)).

Default-related Covenants: These covenants protect the holders of certain issue from the potential value loss due to an event of default in any other debt issue of the same company. For example, Cross Default Covenant activates an event of default in the issue when an event of default has occured to any other debt of the issuer.

Event-related Covenants: In the 80's, the leveraged boyouts (LBOs) caused significant losses to bondholders. In 1986, "poison put" covenant was introduced, which allow investors to sell their holdings back to the issuer at par in the event of a hostile takeover. Later on, another type of covenant, "supoer poison puts", was introduced, which allows sell-back if

[5]For a more formal and detailed description/analysis of Production/Investment, Dividend, Financing and Bonding covenants, see Smith and Warner (1979). Regarding Event-related covenants, see, e.g., Crabbe (1991) on the "Change of Control" covenant and Bhanot and Mello (2005) on the "Rating Trigger" covenant.

[6]See Kalay (1982) for the first set of systematic evidence on the incidence and the tightness of the dividend covenants in a randomly chosen sample of bond indentures.

two designated events are triggered: (1) a major capital structure change, and (2) a rating downgrade from investment to speculate grades.

2.1.2 Covenants in Public Bond Contracts

The protection mechanism we focuses on are the public bond covenants. Public bonds have disperse and fluid ownership. Because of the relatively small ownership of the total outstanding amount of the bond, each bondholder lacks incentive to either monitor the issuer's compliance with the bond indenture, or assess the necessity of enforcement action in case of a covenant breach. This collective action problem results in higher costs to the issuer in obtaining bondholders' consent to a covenant amendment or a waiver of a breach when such a need arises later on.[7] Consequently, public bond contracts include relatively less covenant privisions, which are more standardized and less restrictive.[8]

These institutional features, combined with highly visible corporate transactions in which public bondholders suffer from significant losses,[9] have led to many to view public bond covenants as weak or even valueless "boilerplates" (see, e.g., McDaniel (1986), Fridson (2004), Standard and Poor's (2003)). Next, we discuss the relevant research that more systematically studies the ex ante contracting efficiency and the ex post effectiveness of debt covenants.

2.2 Shareholder-Bondholder Conflicts and Covenant Protection

Theories recognize the cost-benefit tradeoff in choosing covenants. On the one hand, with the covenant protection written in the contract, bondholders lower the premium they require for their investment. On the other hand, restrictive covenants might impose costs on the firm if the restrictions limit the firm's operating flexibility to pursue growth opportunities.[10]. Furthermore, Berkovitch and Kim (1990) point out that, under certain situation, restrictions solving under-investment problem might create incentive for excessive investment

[7] Modification of terms requires consent of bondholders, a process called consent solicitation. A supermajority (2/3) is a commom requirement for indenture changes, although usually simple majorities are required for changes that do not affect payment terms, e.g., coupon and maturity. See Kahan and Tuckman (1993) for evidence of costs incurred to the firm in consent solicitation. Also, Oldfield (2004) discusses a number of strategic game-plays observed among issuer, bondholders and professional arbitragers, which make the process more costly and complex.

[8] The case of private debt is quite different - concentrated ownership, restrictive covenants as one incentive to closely monitor (Rajan and Winton (1995), Smith (1993)) and low costs of renegotiation of covenants. For a thorough discussion of the nstitutional difference between public and private debt contracts, see Amihud, Garbade and Kahan (1999).

[9] Prominant examples include the LBO of RJR Nabisco in which bondholders sustained $1 billion in losses (Lehn and Poulsen (1991)), and the widely covered 1993 Marriott spinoff (Parrino (1997)).

[10] See, e.g., Jensen and Meckling (1976), Smith and Warner (1979), and Berlin and Mester (1992). For models that focus on specific type of covenant, see Myers (1977) on dividend covenants as a solution to underinvestment problem, John and Kalay (1982) who model the cost-benefit tradeoff associated with the dividends payout covenant constraints. More recently, Bhanot and Mello (2005) examine the the cost-benefit tradeoff in choosing "rating trigger clause" (rating decline covenant).

and vice versa. These tradeoffs can be generally summarized under the "Costly Contracting Hypothesis".

The empirical literature on debt covenants has been centered on the "Costly Contracting Hypothesis". Researchers typically focus on the issuance time and examine factors that affect the ex ante covenant choices. Consistent with the theoretical predictions, firms are more likely to include restrictive covenants in their debt if they faces higher the shareholder-bondholder conflicts (e.g., Matitz (1986), Begley and Feltham (1999)). On the costs of covenants, several studies report a negative relationship between growth opportunities and the covenant inclusion for public bond issues.[11] Billet, King and Mauer (2004), however, apply a simultaneous-equation framework to find a strong positive relation between covenant intensity and growth opportunity. Similarly, Bradley and Roberts (2004) observe a positive relation between growth opportunities and covenant inclusion in priviate debt contracts.

Among the issuance-time analysis, most relevant to this paper are Goyal (2004), Bradley and Robert (2004), Chava, Kumar and Warga (2004) and Reisel (2004). These studies relate the covenant choices to the ex ante pricing of the debt, using simultaneous-equation approaches to solve the endogeneity problem of promised (offering) yield and covenant choices at issuance.[12] They all document a negative relation between the promised yield and the presence of covenants.

A small number of studies investigate how covenants protect bondholders ex post in various corporate events.[13] The overall evidence suggests that debt covenants can be strong protection mechanism for bondholders.

This paper extends the literature on several dimensions. First and foremost, this is the first comprehensive analysis of how covenants affect credit spread dynamics after the issuance. Stronger covenants reduce the cost of debt. For rational investors, this relationship should be held both at and after the issuance.[14] Our study complements the recent at-issuance analysis by looking at another important aspect of the price-protection relationship.

Secondly, recent at-issuance covenant-price analysis use the simultaneous-equation approach pioneered by Lee (1978) and Heckman (1979), to address the issue of endogeneity.

[11]See, e.g., Kahan and Yermack (1998), Nash, Netter and Poulsen (2003), Goyal (2003)). A further interesting finding by Kahan and Yermack (1998) is that convertibility seems to subsitute for covenants when firms face high growth opportunities.

[12]Bradley and Robert (2004) study a large sample of priviate debt contracts. Chava, Kumar and Warga (2004) and Reisel (2004) study public bond contracts. Goyal (2004), though in a different context, studies bank subordinated debt contracts.

[13]For example, Asquith and Wizman (1990), Crabbe (1991) and Cook and Easterwood (1994) find takeover-related covenants protect bondholders in LBO events. Masulis (1980) finds bonds with strong protection gain value in debt-to-equity exchange offers, and DeAngelo, DeAngelo and Wruck (2002) on clinical evidence.

[14]Moreover, this should be true even if the terms of the contract deviate from optimality after issuance. This is likely to be a more relevant for public bonds, which are costly to renegotiate and typically have a long time to maturity (Berlin and Loeys (1998), Berlin and Mester (1991), Kahan and Yermack (1998)).

We use a rigorous matching technique to detect causality, by pairing bonds issued by the same issuer with different covenant structures, at each time point. Moreover, the matching technique is more flexible, in that it enable us to detect pricing impact of aggregate strength of the full covenant "package".[15]

Lastly, previous evidence on the ex post effectiveness of covenants are hard to generalize. We study more universal negative situations for bondholders and find strong evidence that, consistent with ex ante expectation, covenants offer strong protection event in unexpected adverse situations ex post.

2.3 Covenant Protection and Corporate Governance

To focus on the role of covenants in mitigating the shareholder-bondholder conflicts, Smith and Warner (1979) start by assuming that manager is perfectly aligned with shareholders, and conclude by recognizing that different agency conflicts should not be viewed in isolation. The Anglo-Saxon view of the corporate governance, on the other hand, focuses on the shareholder-manager conflicts.[16] Recent evidence suggests that some corporate governance mechanisms viewed favorably by shareholders, raises the concerns of creditors.[17] Although a "stakeholder" perspective has been advocated in the literature (see, e.g., John and Senbet (1998) on board effectiveness, Tirole (2001) on a unifying framework), explicit considerations of stockholder-bondholder conflicts in the corporate governance literature is rare. One exception is John and John (1995), who are the first to consider risk-shifting incentive in the design of optimal managerial compensation structure.

Empirically, the evidence suggests that bondholders are concerned about the higher managerial incentives provided by the managerial compensation. Different studies find consistent evidence using different measures of managerial incentives and different methodologies.[18] Most relevant to our analysis is Daniel, Martin and Naveen (2004), who document a positive

[15] Goyal (2004), Bradley and Roberts (2004), Chava, Kumar and Warga (2005) and Reisel (2004) employ a self-selectivity model (Lee (1978), Heckman (1979)) to solve the endogeneity issue. Central to this method is a bivariate choice model, which is suitable for a "Yes/No" choice of certain type of covenant. However, to assess the pricing impact of the full covenant "package", which contains multiple types of covenants, involves probability distribution of higher dimension, which makes the method computationally unpractical. Alternatively, ad hoc assumptions have to be made to reduce the measured aggregate strength of the full covenant "package" to a binary choice variable.

[16] For a comprehensive survey of this subject, see Shleifer and Vishny (1997)

[17] See, e.g., Chava, Dierker and Livdan (2004) on relationship between the G index developed in Gompers, Ishii and Metrick (2003), and the cost of bank debt. Klock, Maxwell and Mansi (2004) relate G to bondholder prices and show a higher cost of debt with higher shareholder rights. Bhojraj and Sengupta (2003) study how institutional investor and outside directors are related to cost of debt. Cremer, Nair and Wei (2004) studies the interaction between the existence of blockholder and the level of anti-takeover protection in the firm's charter provisions. They document that the two mechanisms complement each other in increasing the effective takeover vulnerability of the issuer, and thus increase the cost of debt.

[18] For example, Defusco, Johnson and Zorn (1990) study the announcement effect of new option grants. Bagnani, Milonas, Saunders and Travlos (1994) study the relation between bond return premium and managerial ownership using a regression approach.

relationship between the credit spreads and the Delta and Vega of CEO's total portfolio of stock and options.

This paper extend the corporate governance literature, by bringing together the managerial incentives which is aimed at solving the shareholder-manager conflicts, and the covenant protection which is designed to solve shareholder-bondholder conflicts. In doing so, we provide several new findings. First, higher managerial incentives can be good or bad news for bondholders, depending on how well they are protected by covenants. From bondholders' perspective, managerial risk-taking incentives and covenant protection work as complements, which is what theories would predict. Secondly, from the firm value's perspective, our findlings shed initial lights on the ultimate question of what is the optimal governance structure that most effectively balances among different agency conflicts to maximize the firm value.

3 Data

3.1 Corporate Bond Covenant Provisions

Our main data source is the Mergent Fixed Investment Securities Database (FISD), which contains issue details on over 140,000 Corporate, Corporate MTN (Medium Term Note), Supranational, U.S. Agency and U.S. Treasury debt securities. Among more than 550 data fields, the FISD database provides detailed information on the bonds at the time of issuance, including offering yield, offering amount, coupon type/rate, maturity, callability and putability features etc. A unique feature of FISD is the comprehensive coverage of the bond indenture provisions. The sources for this information are bond prospectus, issuers' SEC filings including 10-K, 8-K, Registration forms, etc.

We focus on public issuers because our analysis require accounting information. Although FISD contains corporate bond issued as early as 1894, we focus on the post-1990 period in which the coverage becomes comprehensive.[19] Table I reports the distribution of bond issues by different categories and the average levels of basic bond characteristics through time. Overall, we have 10725 bonds issued in the 1990-2003 period. We focus on bonds that are not convertible[20] and are issued by industrial or regulated companies. In our sample, about 80% of the bonds are issued by industrial firms. Through time, the offering yields on the bonds in the sample have decreased, and the average bond offering has become larger with

[19]For each issue, FISD provides an variable indicating whether detailed covenant information is collected for that issue. For bonds issued in the post-1990 period, about half of them have missing covenant information and are therefore excluded from our study. Billet, King and Mauer (2004) find that whether a bond issue has covenant information is not a function of when a bond is issued during the year, the priority, rating or maturity of the bond, the size of the issue or the issuer, the exchange on which the issuer's stock trades.

[20]Smith and Warner (1979) suggest, and Kahan and Yermack (1998) empirically confirm, that the convertibility feature might substitute for covenant protection, especially when the issuer has good growth opportunities.

shorter time to maturity and lower coupon rate. In terms of security, more than 90% of the issues are senior debt (senior subordinate, senior, and senior secured). Interestingly, between 1990 and 1994, a period right after the collapes of the junk bond market, more than 25% of the debt issues are secured. When the economical condition turned back after 1994, this percentage dropped to below 10%. On average, more than half of the bonds are investment grade. More than 35% of the bonds are callable, and less than 5% of the bonds are putable. Lastly, more than 60% of the bonds carry redemption features such as sink funds and this percentage has been increasing through time in our sample .

FISD provides data on the incidence of more than 40 covenants. Appendix A lists 44 covenants with brief description for each. We focus on covenants in the following five categories (see Section 2.1.1 for a description) - Production/Investment (Investment), Dividend, Financing, Default-related (Default) and Event-related (Event). We don't include the "Other" category as the incidence of covenants controlling the defeasance procedure is rare in FISD data. Lastly, we exclude from our study the bonding covenants as in Smith and Warner (1979), because FISD doesn't provide enough information. Overall, we have 28 covenants in subsequent analysis. as Appendix I shows, the "Investment" and the "Financing" categories contain 9 and 12 covenants, respectively, whereas the other three categories each contain no more than 3 covenants.

Table II reports, for each covenant in each sub-period and the full-sample period, the percentages of the bonds issued in each period that carries it. In each category, there are "popular" and "unpopular" ones. For example, more than 84% of full sample contains covenants restricting sale of asset or consilidation merger and more than 50% of the bonds contain the negative pladge covenant which restricts issuance of debt of equal or higher priority than the current one. On the other hand, very few bonds have covenants that use leverage test to restrict debt issuance. Moreover, the popularity of certain covenant seems to be time-varying. For example, in the 1990-1994 period, more than 25% of the issuances are secured, but in later period less than 10% of the bonds carry this type of protection. Lastly, there is a firm-level clustering among the incidence of covenants - the average of pairwise correlations among the 28 covenants is 0.20

3.2 Covenant Protection Index

To capture the strength of protection of the total covenant "package" of a bond issue, a measure is needed. Index contruction has been used as a promising methodology in recent corporate governance research. A prominent example is the Governance Index constructed by Gompers, Ishii and Metrick (2003), to proxy the strength of shareholder rights.[21] As a first

[21] Regarding covenant protection, Bradley and Roberts (2003) use this method to measure the covenant intensity of private debt contracts. Chava, Kumar and Warga (2004), and Billet, King and Mauer (2004)

attempt, We follow the method of Gompers, Ishii and Metrick (2003), to build a covenant protection index J, by counting the number of covenants included in each contract.[22] We also construct subindices for each of the five covenant categories.

The J index reveals non-trivial time-series and cross-section variation in the covenant structure of the bonds in our sample. Moreover, as Table III shows, after combining the index data with the bond price data, the time-series and cross-section variation of the J index remains similar to the pattern in Figure I. Lastly, the correlations among the five subindices range between .37 (financing subindex and default subindex) and .77 (investment subindex and dividend subindex).

The J index is a straightforward way to capture the covenant intensity in each bond contract. By treating each covenant with equal weight, however, this method ignores any complementarity or substitute effect among different covenants, especially covenants in the same category. To partially address this potential measurement problem, we define a second index W, as the number of covenant categorie(s) which has (have) certain covenant member(s) included in the indenture. By definition, W ranges between 0 (weak) and 5 (strong). Table IIII shows that, in the final dataset which combines the index data with the bond price data, there is reasonable cross-section variation of W in each year. Lastly, the spearman correlation between W and J is .93;

Besides J and W, we later use estimated pricing impact of each unique combination of covenant types, to come up with an weighted ranking of each covenant "package", as a third measure which we call W2 index. Throughout this study, the W measure is the main focus, although analysis using J or W2 generally yields qalitatively similar results.

3.3 Corporate Bond Prices

The main purpose of this paper is to investigating the impact of covenant protection on the dynamics of credit spreads. Data of secondary market prices of corporate bonds is not easily available. To maximize the sample size and therefore the power of the empirical tests, we collect corporate bond prices from three sources. Our first source is the Lehman Brothers' Bond Database (LBBD), which have been a major data source for corporate bond prices(yields) in previous bond pricing literature (see, e.g., Elton, Gruber, Agrawal and Mann (2001)). LBBD reports the institutional pricing for Treasury and corporate bonds. The dataset contains both matrix prices as well as dealer quotes, and we only use dealer quotes.[23]

appliy this method to FISD data. They all use the method of Gompers, Ishii and Metrick (2003).

[22] Bradley and Roberts (2003) use this method to measure the covenant intensity of private debt contracts. Chava, Kumar and Warga (2004), and Billet, King and Mauer (2004) appliy this method to FISD data.

[23] Matrix prices are set according to some pricing algorithm based on bonds with similar characteristics, whereas dealer quotes directly reflect market participants' evaluation. Matrix prices are regarded as less reliable than actual dealer quotes (see, e.g., Warga and Welch (1993), and Elton, Gruber, Agrawal and Mann (2001)).

Finally, LBBD also provides information on some issue characteristics such as issue size, maturity, callability, seniority and credit ratings which we use as controls in our regression model.[24]

Since our LBBD source stops in 1997, we use two alternative sources for the post-1997 period. The first source is the National Association of Insurance Commissions (NAIC) transaction data, which consists of all 1995-2002 transactions by life insurance, property and casualty insurance, and Health Maintenance Organization (HMO) companies as distributed by Warga (2000). This database is an alternative to the no longer available Warga (1998) database . The NAIC data has been used in recent study by Campbell and Taksler (2003), where they provide evidence that the transaction database is representative of the corporate bond market. The second source of bond prices is the Salomon Brothers Yield Book of Citigroup. For the "exogenous shock" analysis in Section III, we manually collect market quotes of investment-grade and high yield bonds which are components of Citigroup's US Broad Investment-Grade Bond Index^{SM} and US High-Yield Market Index^{SM}. [25]

We focus on bonds which have Standard and Poor's and Moody's credit ratings between AA+ (Aa1) and B- (B3).[26] AAA (Aaa) bonds in both LBBD and NAIC datasets have appeared "problematic" in previous studies (see. e.g., Elton, Gruber, Agrawal and Mann (2001)), and we follow the literature to exclude bond observations with AAA (Aaa) ratings. We also remove high yield bonds rated CCC+ (Caa1) or below, because there are not enough number of observations for bonds below CCC+ and there are also potential problems that prices of these bonds are more likely to contain errors due to infrequent trading/quoting. We keep speculative-grade bonds above B- (B3), however, because covenant incidence usually increases with the risk of the bonds and it is important to keep reasonable variation in the covenant indices for the purpose of this study. To ensure that the high yield bond prices are representative of the market, we only focus on the month in which at least 10 bond transactions are observed among the insurers. We then pick the price of the transaction which is closest to the end of month.

The risk-free term structure of interest rates is from the Salomon Brothers Yield Book, including the quarterly treasury benchmark yields with time-to-maturity of 1, 2, 3, 5, 10, 20 and 30 years. To calculate the credit spreads of each observation, we match by time-to-maturity to get the corresponding Treasury benchmark yield and adjust the bond yield

[24] See the description of Table 4 on these controls used in the regression model.

[25] Yield Book maintains and publishes a large set of indices on different sectors of US fixed income market. The indices are widely used by major financial institutions. The group uses well-defined procedure in data collection and index construction to ensure the indices well represent the overall market condition. In particular, for all issues used in constructing any of Citigroup indices which are updated monthly, month-end market quotes of every issue are gathered from multiple sources.

[26] For those months in which ratings of the two agencies do not coincide, our results are robust to using either source. Results reported are based on Standard & Poor's ratings. Results based on Moody's ratings are available for request.

with the corresponding risk-free interest rates. We use linear interpolation to calculate Treasury yields with time-to-maturity of other years below 30. For the few observations with time-to-maturity of more than 30 years, we use the 30-year Treasury benchmark. For each observation, the spread is calculated as the difference between the bond yield and its corresponding Treasury benchmark.The term structure of interest rate is used to compute not only the credit spreads, but also to control variables of the term structure.

3.4 Other Data

Controls for firm characteristics are constructed using data from COMPUSTAT. Stock market data is from CRSP monthly data source. Appendix II describes construction of all control variables.

We control for credit ratings in all regressions. One concern might be that rating already reflect the effect of protective covenants and therefore estimation of the coefficient of the protection index is biased. However, covenants do not seem to be systematically incorporated in rating agencies' rating process. For example, in Standard and Poor's "Rating Methodology: Evaluating the Issuer" (Standard and Poor's (2004)), the agency explicitly states "Covenants do not play a significant enhancing role in determining the credit ratings assigned to companies" and "there is no point in analyzing fine variations among different covenant pack-ages, which certainly will not affect a particular borrower's ability to meet its obligations in a timely fashion". As a result, credit ratings are used solely as control for credit risk components in the yield spreads, which are not likely to bias our estimating the beneficial impact brought in by protective covenants .

4 Covenant Protection and the Dynamics of Credit Spreads

This section presents a detailed analysis of the impact of covenant protection on the dynamics of credit spreads. We first document a strong negative relationship between credit spreads and covenant protection. We also provide evidence that the relationship is causal instead of being driven by the issue of endogeneity. We further document the protection effect of covenants under negative shocks usint two types of exogenous events.

4.1 Do Credit Spreads Reflect the Impact of Covenant Protection?

Better bondholder protection helps the investors avoid many situations that could negatively affect bond prices, whether due to managerial discretion or due to unexpected changes. Consequently, bond yields should reflect this "protection" effect. Based on this simple intuition, bond yield spreads should be negatively associated with the bondholder protection index, ceteris paribus. A competing hypothesis is the "boilerplate" view of public bonds, which predict covenants have no impact on credit spreads.

From 1990 to 2002, our sample consists of an average of 939 bonds from 307 firms per year, with an average of 3.03 bonds per firm. We start by presenting some summary statistics of our data. Table IV reports the average number of bonds per year and per firm as well as the some percentiles of the Bondholder Protection Index J and W (see Figure I for a futher visualization of the time-variation of J and W). The sample median of J and W are fairly stable in the 13-year sample period. Importantly, there is a noticeble cross-section variation of both measures in every year.

4.1.1 Credit Spread Regression

To first document the association between credit spreads and covenant protection, we regress the yield spreads on the protection index plus standard controls.

Columns M1-M4 in Table IV present results from the Fama-MacBeth methodology by regressing, in each month, yield spreads on the protection index measures J or W, a constant and a set of controls. The time-series average of monthly coefficient estimates is reported with the associated t- statistics. First, all the controls have their expected signs and reasonable magnitudes. For example, bondholders demand higher yields from firms that are smaller, have poor performance, and have fewer growth opportunities (proxied by the market-to-book ratio) or negative past stock performance. Higher stock return volatility, higher leverage and issues that are callable by the issuer are also associated with higher yield spreads. Finally, coefficient estimates of rating dummies are generally consistent with the notion that lower-rated issues have high-yield spreads.

Model 1 has protection index using measure J added into the specification. In cross section, bonds with higher J have statistically significantly lower yield spreads. Moving from the 10th percentile (J=3) to the 90th percentile (J=8) of the measure J corresponds to a yield spread difference of 15 bp, and the difference in yield spread between a bond with no protection and a bond with the highest protection (J=15) is as high as 45 bp (0.032 x 15).

Model 2 presents results using W, our main proxy for bondholder protection. W is constructed by counting the existence of different types of covenants, namely restrictions on the issuer's investment, financing and dividend policies, plus the bondholders' rights when an issue is in default and protections bondholders have when there is a hostile takeover. W has a strongly negative and significant coefficient of -0.07 with a t-statistic of -8.26. The presence of strong covenant protection is associated with lower bond risk. The yield spread difference between a bond with minimum and maximum W is as high as 34 bp (0.067 x 5).

Models 1 and 2 impose a linear relationship between credit spreads and J or W, an assumption likely to be too strong for these noisy measures. We then run the regression in a piecewise linear fashion by using dummies for each level of W. Models 3 and 4[27] show that, relative to the weakest protection level (W=0), bonds with protection W>2 have significantly lower credit spreads, with stronger protection generally associated with a negative coefficient of larger magnitude. For example, credit spreads of bonds with (W=2) are, on average, 10 bp lower than those with (W=0).This difference increases to 30 bp for bonds having the maximum protection (W=4 or 5).

Models 5 to 8 are estimation results using panel regression as an alternative approach.[28] The results become stronger. For example, the difference between a bond with minimum protection (W=0) and maximum protection (W=4 or 5) is 65 bp and is highly significant.[29]

Results in Table IV suggest that looking further into each W category could improve the index measure. In results not reported, we estimate the pricing impact of each unique combination of covenant categories within the same W category. There are 24 such combinations. By ranking these packages by their pricing impact and then using the pricing impact as the weight, we construct a pricing-impact weighted index, W2, ranging from 0 to 1.12. Again, we find a significant, negative relation between the credit spreads and the W2 index. In particular, in regression of credit spreads on W2 conditional on rating quality (investment or non-investment), we find a stronger spread–W2 relationship for bonds rated speculative – the difference between a bond with minimum and a maximum W2 can be as large as 141 bp.

4.1.2 Concern of Endogeneity: At-issuance vs. After-issuance

Results in Table V using post-issuance bond yield series are consistent with the notion that covenant protection benefits investors and thus lowers the cost of debt of the issuer. A concern, however, is that covenant protection is endogenous at the issuance time, when the pricing and the covenant choice are determined simultaneously. To the extent some concern of issuer risk is not captured by credit ratings and other controls, it will be reflected in both the pricing (dependant variable) and the covenant choice (independent variable), and the existence of covenants might simply represent this unobservable risk component (see, e.g., Bradley and Robert (2004)). Econometrically, a missing variable problem biases the estimation.

[27]As Table IV shows, we have relatively few observations with W=4 or W=5. Therefore, we combine these two categories and use one dummy for (W>=4) in Model 4.

[28]In our sample, an issuer on average has three bonds outstanding, and an intra-firm variation in J or W indices exist in slightly more than 30% of the issuers. When we utilize this intra-firm variation in W, adding fixed effect to remove fixed unobservable firm characteristics in this sub-sample, we find results consistent with Table V, with similar significance but slightly less magnitude in the coefficient estimates. These results are available on request.

[29]Throughout our analysis, the t-statistics are corrected for White's heteroskedasticity and clustering among bonds issued by the same issuer. We also calculate New-West standard errors with 1 lag, and the significance of all key results remains. These results are available on request.

By definition, the problem above is most prominent at the issuance time. Our analyses focus on the credit spreads of bonds that have been outstanding for at least 1 year. Since public bond covenants rarely change after issuance, and because the market processes all available information in continuously pricing the bonds, the extent to which the issuance-time endogeneity problem might continue to biases our after-issuance analysis is unclear.

As a first check, we construct a "generic case of endogeneity" by applying the same empirical model to at-issuance data separately collected. If the results for this case look similar to Table IV, it will be a first warning. Table V compares results in Models 5 and 6 with results from the same specification applied to the generic case of endogeneity and shows completely opposite results. A significantly positive spread–protection relationship is observed in issuance-time analysis (Models 3 and 4 in Table V). Bradley and Robert (2004) call this single-equation result a "perverse" positive association, which they interpret as covenant choice proxying for risk when the endogeneity problem is not corrected. When they use a self-selectivity model (see, e.g., Lee (1978) and Heckman (1979)) to control for the simultaneity of covenant choice and pricing, they find a negative covenant–pricing relationship at the issuance time, which our after-issuance regression results coincide with.

The at-issuance generic case of endogeneity coincides with Bradley and Roberts' (2004) perverse positive association and the after-issuance relationship is consistent with their endogeneity-corrected results. Coupled with the dichotomy between the signs of the relationship estimated in at-issuance and after-issuance stages, this alleviates the concern that results in Table V suffer from the endogeneity problem. Moreover, a negative spread–protection relationship is consistent with the economic intuition that, ceteris paribus, higher protection should lower the cost of debt.

To be conservative, the true nature of the endogeneity is largely unknown. However, evidence in Table VI suggests that any endogeneity-related interpretation of the strong negative spread–protection relationship cannot rely on the simultaneity nature of the problem at the issuance time.

4.1.3 Concern of Endogeneity: Detect Causality via Matching

In our sample, there are, on average, 3 bonds issued by each firm. Many times the J and W indices of these bonds differ,[30] and many times firms have multiple bonds outstanding and an intra-firm variation in covenant protection exists. This provides a natural experiment for us to detect causality via a matching technique.

Matching is a widely-used method for evaluating "treatment effect".[31] It is based on the

[30] Firms use public debt financing at different time points and existing evidence suggests that many time-varying factors related to the firm and the macroeconomy (see, e.g., Bradley and Roberts (2004)) determine different covenant structures under different conditions.

[31] The pioneering work is Heckman (1979). Heckman, Ichimura and Todd (1997, 1998) provide compre-

intuitively attractive idea of contrasting the outcomes for a "treated" group and a "non-treated" group matched on relevant characteristics. A difference in the outcomes is then attributed to the impact of the treatment. Heckman, Ichimura and Todd (1997, 1998) show that the data and matching method must meet certain conditions in order to substantially reduce bias in non-experimental estimates.[32] They include: (1) controls and participants have the same distribution of observed personal characteristics, (2) outcomes and characteristics are measured in the same way for both groups and (3) participants and controls are placed in the same economic environment. For our purpose, the outcome being measured is the difference in credit spreads. The group of bonds with minimum protection (W=0) can be thought of as the control (non-treated) group and bonds with greater protection levels (W>0) as the participants (the treated group). In the current case, conditions (2) and (3) are met almost perfectly, as market-determined credit spreads of bonds issued by the same firm are compared at the same point in time.

Regarding condition (1), existing methods attempt to match on personal characteristics. These methods, however, are all based on a binary choice of Treated/Not treated, which is not adequate for our purpose of measuring the incremental impact of multiple levels of higher protection on credit spreads. In other words, the treated group in our setting is not one, but five groups, corresponding to W levels 1 to 5. This makes popular matching methods such as the propensity score method infeasible.[33]

We adopt a "hybrid" approach by applying the dimension-by-dimension matching followed by a regression-based analysis. Specifically, in the first matching step, we match bonds of the same issuer in each month, which are identical in seniority, callability, putability, bond type[34] and redemption (i.e., whether the bond has a sinking fund provision). Secondly, we regress the credit spread difference between the matched pairs on the other key characters that are continuous variables: coupon, time to maturity, bond life and size of the issue.

In particular, we first measure the average impact of different levels of the higher-protection group by using dummies for each type of pairs – (W=0, W=1), (W=0, W=2) and (W=0, W=3) – in the second-step regression. Panel A of Table VI shows that, consistent with a causality relationship, bonds that differ only in the degree of protection in the contracts are priced differently by investors: relative to bonds with minimum protection (W=0), higher-level protection always reduces credit spreads. For bonds with W equal to 2, credit spreads are reduced by 91 bp. Interestingly, the spread-reduction effect is not monotonic. Both findings are consistent with the spread regression results in Table IV.

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hensive summaries of the main intuition and existing estimation methods.

[32]This description closely follows Bharath (2002), who applies the matching method to studying differential pricing between bank loan and bond of the same issuer due to bank specialness and renegotiation.

[33]I thank Bill Greene for discussion on this issue, and for his suggestions on the "hybrid" approach.

[34]The majority of our sample contains corporate debentures, but there are other bond types, e.g., corporate zeros and corporate medium-term notes.

In summary, both the generic case of endogeneity and the matching test find supporting evidence that a significant negative spread–protection relationship exists in the after-issuance dynamics of credit spreads and, moreover, the relationship seems to be causal: strong covenant protection lowers credit spreads, instead of being driven by the endogeneity problem. Consistent with findings in Bradley and Roberts (2004) and Chava, Kumar and Warga (2004), bondholders not only price-in the protection effects of covenants when the contract is written, they continue to value the protection long after issuance. This evidence is not consistent with the boilerplate view of public bond covenants, but instead suggests that this contractual device is an effective governance mechanism protecting bondholders' investment. We study this implication in the next exercise.

4.2 Is Covenant Protection Effective When Bondholders Need It?

The evidence reported above reveals an average effect of covenant protection on credit spreads. However, business conditions constantly change and firms experience ups and downs all the time. Covenants are protection against downside risk; a nature question is: does it really work when bad times emerge? Evidence of the average effect we just presented suggest yes, but the aforementioned, somehow popular boilerplate view says the opposite regarding the effectiveness of this important protection mechanism for bondholder. We next focus on specific types of "downtime" – negative shocks that are exogenous to the issuers – to provide new evidence.

4.2.1 Industry-wide Negative Shocks

Industry-wide negative shocks provide a nice setting to study how market prices respond under unexpected bad news. If the covenant is an effective protection mechanism, investors should recognize it and, ceteris paribus, the downward price adjustment under negative shocks should be less severe for bonds with stronger protection.

We define industry-wide negative shocks as sudden drops in the industry-median equity return.[35] If an industry-median monthly stock return resides in the left 10% tail of the empirical distribution of industry-median returns in this industry in the past 25 years, we define that month as a "shocked month" for the particular industry. We then collect monthly credit spread changes for bonds in that industry during the shock month and investigate whether they are a function of each issue's protection level. In selecting proper controls, we follow the literature on the determinants of credit spreads changes (see, e.g., Collin-Dufresne, Goldstein and Martin (2001)), including changes in each issuer's stock return and volatility,

[35] Lamont and Polk (2002) propose this approach in the context of diversification. Specifically, they use changes in industry median of diversity measures to define exogenous changes in diversity to firms in that industry.

changes in macroeconomic conditions such as level and slope of the Treasury yield curve, etc.

Panel A of Table VII shows the credit spread changes during negative industry shocks, as a function of level of covenant protection and standard controls (omitted). Results using indices W and W2 are reported. On average, credit spreads under the shock jump by 32 bp (Models 1 and 3) to 54 (Models 2 and 4) bp depending on the specification. However, bonds with strong protection experience a much less severe jump in credit spreads: in Models 1 and 3, the mitigation effect of protection can be as high as 5 x 4.7=23.5 bp; regarding the fine-tuned W2 measure, Models 2 and 4 suggest that the mitigation effect can be as large as 1.12 x 48.8=53.76 bp, almost entirely eliminating the damaging effect of the shock.

4.2.2 An Economy-wide Extreme Shock

Next, we look at an economy-wide, exogenous and extreme negative shock: the 9/11 event. The NYSE was closed for 4 days following September 11th, 2001, during which the S&P 500 dropped by more than 20% (from 248.35 (9/11) to 225.62 (9/17)). The credit market saw heightened credit risk – Moody's baa corporate bond index jumped by 25 bp, from 7.83% on 9/10 to 8.08% on 9/17.

From the Salomon Brothers Yield Book, we collect bond yields at two time points, August, 2005 and October 2005, for a sample of 1257 bonds with covenant data in FISD. Credit spread changes between the 2 months are calculated to measure the market response to the 9/11 event. We then run a cross-section regression similar to the specification in Panel A.

Panel B of Table VII shows that, in cross section, bonds with covenant protection experienced a much less severe jump in credit spreads. Model 3 and 4 are regressions of yield spread changes on the W index, past change of stock returns and change of stock volatility plus rating class controls. The negative coefficient of W indicates that, with higher protection in the bond indenture, bond yield spreads will jump less. The estimate is, however insignificant, presumably due to non-linearity in the spread–protection relationship when investors are faced with an extreme shock. In Models 5 and 6, the regressions are therefore run on 3 dummies, corresponding to different levels of the W index. The results shows that, relative to issues with low protection (W=0 or 1), bonds with higher protection levels experienced much less severe jumps in credit spreads. The magnitude is as high as 47 bp. This is strong evidence that investors greatly value the indenture protection, even when the whole country and the economy is suddenly facing a highly uncertain prospect. The non-linearity in the results, however, is much stronger than previous general analysis, rendering estimate of a single efficient of W insignificant. This suggests that, after the extreme negative shock, investors might have limited ability to gauge the impact of fine variation in different covenant packages, and the first-order effect is therefore whether there is covenant protection or not.

In summary, we find strong evidence for several arguments. First, bondholder protection offers economically important benefit to investors, and bond investors continue to value this protection after the issuance in the issuer's course of business. More importantly, better protection causes lower premiums to be charged on the bonds. Secondly, the strong protection effect of covenants shows up at times when this mechanism is in the greatest need. This is in sharp contrast to the boilerplate view of public bond covenants. Lastly, analysis in this section validates the simple W (and J) index and the more sophisticated W2 index developed in Section II as proper proxies for the level of protection innate in public debt contracts.

5 Covenant Protection and Managerial Incentives

The corporate governance literature has focused on solving the shareholder-manager conflicts. Shareholder value maximization is consistent with the neoclassical view of the firm-value maximization, if better aligned managers will always take more positive NPV projects. However, recent evidence suggest that, in many cases, proxies for good equity governance mechanisms are associated with higher cost of debt.[36] In particular, previous research has documented that high CEO incentives lead to higher cost of debt (Defusco, Johnson and Zorn (1990), Bagnani, Milonas, Saunders and Travlos (1994), and Daniel, Martin and Naveen (2004)). Moreover, Coles, Daniel and Naveen (2005) find that higher sensitivity of CEO wealth to stock volatility (Vega) incentivizes CEOs to implement riskier investment and debt policies, suggesting possible channels that CEO risk-taking incentives might affect bondholders.[37] The evidence seems to suggest worsened shareholder-bondholder conflicts due to enhanced alignment between shareholders and manager. However, it also raises important questions which are unanswered - Is the worsening situation for bondholders universal? Why don't we see any effect of the enhanced incentives to take positive NPV projects, which is presumably the main effect of increasing CEO incentives? In this section, we shed new light on these questions by studying the interaction between covenant protection and managerial incentives.

To measure CEO incentive, we follow the literature to construct two measures. Delta is the change in the dollar value of the executive's wealth for a one-percentage point change in stock price. Vega is the change in the dollar value of the executive's wealth for a 0.01 change in the annualized standard deviation of stock returns. The calculation follows Guay (1999) and Core and Guay (2002), who use the Black-Scholes option valuation model. See Appendix III for a detailed description. We use the Standard and Poor's Execucomp database for data on CEO compensation. Execucomp provides data on salary, bonus and total compensation for

[36] See footnote 17 for a list of the relevant findings.

[37] For other evidence on the relation between managerial incentives and decision making, see, e.g., Agrawal and Mandelker (1987), Aggarwal and Samwick (2002) and Mehran (1995). For other evidence on the relationship between managerial incentive and firm risk (e.g., stock volatility), see Cohen, Hall and Viceira (2000). Theoretically, however, incentivizing managers using option-like compensation does not necessarily make the manager less risk averse. See, e.g., Carpenter (2000) and Ross (2004).

the top five executives (ranked annually by salary and bonus) of firms in the S&P 500, S&P Midcap 400, and S&P Smallcap 600, for the period 1993-1997. Only industrial companies are selected.

We first provide summary statistics of some key variables. Mean (median) Delta is 0.43(0.19) million dollars. Mean (median) Vega is 0.08(0.05) million dollars. These values are comparable to numbers reported in other studies. Market size and leverage are representative of large firms. There is reasonable variation in the bondholder protection measures J and W. Lastly, less than 25% of the bond observations have a speculative credit rating.

Table VIII presents the Fama-MacBeth regression results. Model M1 simply replicates the key results of Daniel, Martin and Naveen (2004). Delta and Vega are both positively associated with credit spreads, but the main driving force is the CEO's risk-taking incentive, as proxied by Vega. In all models, a 1 million dollar increase in Vega is always associated with an increase of at least 25 bp in credit spreads. Consistent with earlier tables, the W index alone is always negatively associated with credit spreads, but with smaller magnitude. The key results are presented in M3 and M4, where Vega is interacted with dummies for different protection levels in the W index. It is clear from M3 and M4 that the relationship between Vega and credit spreads is a function of the level of covenant protection. For example, in Model M3, when the bonds' protection level W is below 3, a 1 million dollar increase in CEO's risk-taking incentive (Vega) is associated with an increase of 35 bp in the credit spread. Moreover, the low protection plays no role in altering the spread–Vega relationship. When W is in the relatively high range, however, the overall sensitivity of credit spread with respect to the Vega incentive is greatly reduced – a 1 million dollar increase in Vega now is only associated with a modest increase of .359-.296=6.3 bp in credit spread. The effect of bondholder protection in mitigating Vega's impact becomes clearer in Model M4, where the range of W in the interaction terms is further decomposed into W=3 and W=4 or 5. For W=3, the overall relation between Vega and credit spread is still positive (.367-.282=.085); whereas for higher protection levels of W=4 or 5, a one-million dollar increase in Vega is now associated with a reduction of 74-36.7=37.3 bp in the credit spread. For bonds with high protection, an increase in CEO's risk-taking incentive becomes beneficial to bondholders.

Agency theories predict that higher managerial incentives could be good or bad news for bondholders. Because of the shareholder–bondholder agency conflict, bondholders require covenants in the bond indenture to protect them from opportunistic behavior of the manager who is on behalf of the shareholders. Theories predict that, with effective protection, the beneficial side of managerial incentives, i.e., to accept positive NPV projects, should be reflected in higher bond prices. Results presented in Table VIII are consistent with this view. From the bondholders' perspective, high managerial incentives and strong covenant protection work as complements.[38] From the perspective of firm value maximization, results

[38] This is consistent with findings in Cremers, Nair and Wei (2004), who show that takeover–related bond

in this section further suggest that the complementarity results might also apply to the firm as a whole. In particular, to the extent that higher Vega increases risk taking of the firm, as recently documented in Coles, Daniel and Naveen (2005), our findings suggest that covenant protection might help mitigating the risk shifting component in CEO risk-taking incentives. However, the implications of our results for the firm value is at best indirect, and this issue is currently being explored more directly in a seperate study.

6 Conclusion

Different claimholders rely on different mechanisms to protect their investments. Covenants are the central governance mechanism for debtholders. Given the apparent costs and benefits, their impact on the debtholders has not been systematically studied. Moreover, agency theories suggest that contracts used by different groups of investors are interdependent. To fully understand the value implication of one mechanism (e.g., managerial incentive), its interaction with other mechanisms can't be ignored. These are the main motivations for our study.

We make several contributions to the literature. First, we construct a covenant protection index to measure the aggregate strength of the covenant protection in each bond contract. We document that the protection effect is strongly reflected in the after-issuance dynamics of credit spreads. Moreover, we conduct novel analysis to mitigate concern of endogeneity. This also validates the indices as legitimate measures of protection strength instead of risk proxies.

Secondly, we complement the empirical literature on covenant choice by providing a more complete picture of the protection effect of covenants on the dynamics of credit spreads. Specifically, the protection benefits not only show up in credit spreads on average, but are also strongly reflected in the prices' response to unexpected negative shocks. This is the first systematic evidence that public bond covenants, despite their lack of detail and flexibility as compared to private debt covenants, are far from valueless boilerplate.

Thirdly, we shed new light on the interdependence of contracts written for different claimholders. Managerial incentives do concern bondholders, but the effect is not universal. In fact, when strong managerial incentives and strong covenant protection are both in place, our evidence suggests that bondholders benefit from the higher CEO risk-taking incentive. This is the first systematic evidence on the interaction between the two mechanisms designed to protect two groups of claimholders, and the evidence is consistent with what seminal theories imply.

Our findings lead to several directions for future research.

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covenants protect bondholders from the negative impact of enhanced takeover vulnerability.

First, we are only able to document the benefits covenants bring in, which by definition should be the first-order effect on bondholders. The costs associated with covenants, i.e., constrained managerial flexibility in pursuing growth opportunities, are likely to be shouldered by the residual claimholders. To the extent that the benefits and costs are two sides of the same coin, a natural next step is relating equity performance to the level of covenant protection.

Secondly, by focusing on public bonds, we have neglected private debt contracts, which have very different institutional features. Therefore, a similar analysis of private debt covenants is likely to reveal new and interesting features. Moreover, there are views on intra-creditor conflicts and the impact of covenants in one debt contract on other contracts. Although our analysis is robust to these concerns, these questions are worth further investigation.

Finally, the effectiveness and optimality of a particular governance mechanism, whether designed for shareholders or debtholders, should be ultimately evaluated by its impact on the firm value. To the extent the solutions to one type of agency conflict could exacerbate the other type, a thorough analysis should consider the aggregate value impact on all claimholders. This study makes a first step in this direction.

APPENDIX I: Description of Covenant Provisions

Covenant Name	Category	Description
CHANGE CONTROL PUT PROVISIONS	**Event**	Upon a change of control in the issuer, bondholders have the option of selling the issue back to the issuer (poison put). Other conditions may limit the bondholder's ability to exercise the put option. Poison puts are often used when a company fears an unwanted takeover by ensuring that a successful hostile takeover bid will trigger an event that substantially reduces the value of the company.
RATING DECLINE TRIGGER PUT	**Event**	A decline in the credit rating of the issuer (or issue) triggers a bondholder put provision.
CROSS DEFAULT	**Default**	A bondholder protective covenant that will activate an event of default in their issue, if an event of default has occurred under any other debt of the company.
CROSS ACCELERATION	**Default**	A bondholder protective covenant that allows the holder to accelerate their debt, if any other debt of the organization has been accelerated due to an event of default.
DIVIDENDS RELATED PAYMENTS	**Dividend**	Flag indicating that payments made to shareholders or other entities may be limit to a certain percentage of net income or some other ratio.
RESTRICTED PAYMENTS	**Dividend**	Restricts issuer's freedom to make payments to shareholders and others.
FUNDED DEBT	**Financing**	Restricts issuer from issuing additional funded debt. Funded debt is any debt with an initial maturity of one year or longer.
INDEBTEDNESS	**Financing**	Restricts user from incurring additional debt with limits on absolute dollar amount of debt outstanding or percentage total capital.
LIENS	**Financing**	In the case of default, the bondholders have the legal right to sell mortgaged property to satisfy their unpaid obligations.
SALES LEASEBACK	**Financing**	Restricts issuer to the type or amount of property used in a sale leaseback transaction and may restrict its use of the proceeds of the sale.
SENIOR DEBT ISSUANCE	**Financing**	Restricts issuer to the amount of senior debt it may issue in the future.
STOCK ISSUANCE ISSUER	**Financing**	Restricts issuer from issuing additional common stock.
STOCK TRANSFER SALE DISPOSAL	**Financing**	Restricts issuer from transferring, selling, or disposing of its common stock.

SUBORDINATED DEBT ISSUANCE	**Financing**	Restricts issuance of junior or subordinated debt.
NET_EARNINGS TEST ISSUANCE	**Financing**	To issue additional debt the issuer must have achieved or maintained certain profitability levels.This test is a variations of the (more common) fixed coverage tests.
LEVERAGE TEST	**Financing**	Restricts total-indebtedness of the issuer.
NEGATIVE PLEDGE COVENANT	**Financing**	The issuer cannot issue secured debt unless it secures the current issue on a pari passu basis.
BORROWING RESTRICTED	**Financing**	Indicates subsidiaries are restricted from borrowing, except from parent.
DIVIDENDS RELATED PAYMENTS	**Financing**	Limits the subsidiaries' payment of dividends to a certain percentage of net income or some other ratio. For captive finance subsidiaries, this provision limits the amount of dividends which can be paid to the parent. This provision protects the bondholder against a parent from draining assets from its subsidiaries.
FUNDED DEBT	**Financing**	Restricts issuer's subsidiaries from issuing additional funded debt (debt with an initial maturity of longer than one year).
INDEBTEDNESS	**Financing**	Restricts the total indebtedness of the subsidiaries.
STOCK ISSUANCE	**Financing**	Restricts issuer from issuing additional common stock in restricted subsidiaries. Restricted subsidiaries are those which are considered to be consolidated for financial test purposes.
PREFERRED STOCK ISSUANCE	**Financing**	Restricts subsidiaries' ability to issue preferred stock.
SUBSIDIARY LEVERAGE TEST	**Financing**	Limits subsidiaries leverage.
CONSOLIDATION MERGER	**Investment**	Indicates that a consolidation or merger of the issuer with another entity is restricted.
INVESTMENTS	**Investment**	Restricts issuer's investment policy to prevent risky investments.
MAINTENANCE NET WORTH	**Investment**	Issuer must maintain a minimum specified net worth.
SALE ASSETS	**Investment**	Restrictions on the ability of an issuer to sell assets or restrictions on the issuer's use of the proceeds from the sale of assets. Such restrictions may require the issuer to apply some or all of the sales proceeds to the repurchase of debt through a tender offer or call.
TRANSACTION AFFILIATES	**Investment**	Issuer is restricted in certain business dealings with its subsidiaries.
FIXED CHARGE COVERAGE	**Investment**	Issuer is required to have a ratio of earnings available for fixed charges, of at least a minimum specified level.

DECLINING NET WORTH	**Investment**	If issuer's net worth (as defined) falls below minimum level, certain bond provisions are triggered.
ASSET SALE CLAUSE	**Investment**	Covenant requiring the issuer to use net proceeds from the sale of certain assets to redeem the bonds at par or at a premium. This covenant
INVESTMENTS UNRESTRICTED	**Investment**	Restricts subsidiaries' investments.
SALE TRANFER ASSETS UNRESTRICTED	**Investment**	Issuer must use proceeds from sale of subsidiaries' assets (either certain asset sales or all asset sales over some threshold) to reduce debt.
SUBSIDIARY REDESIGNATION	**Investment**	Indicates if restricted subsidiaries may be reclassified as unrestricted subsidiaries. Restricted subsidiaries are those which are considered to be consolidated for financial test purposes.
SALES LEASEBACK	**Investment**	Restricts subsidiaries from selling then leasing back assets that provide security for the bondholder. This provision usually requires that assets or cash equal to the property sold and leased back be applied to the retirement of the debt in question or used to acquire another property to increase the debtholders' security.
LIENS	**Investment**	Restricts subsidiaries from acquiring liens on their property.
FIXED CHARGE COVERAGE	**Investment**	Subsidiaries are required to maintain a minimum ratio of net income to fixed charges.
COVENANT DEFEASANCE WITHOUT TAX CONSEQUENCE	**Other**	Covenant defeasance only, is permitted. Issuer's legal counsel's opinion states that bondholders will not recognize income for federal tax purposes as a result of the defeasance. Covenant defeasance removes the debt from the issuer's balance sheet and frees the issuer from the other covenants, but the bondholder claims on revenues and other security are not extinguished.
LEGAL DEFEASANCE	**Other**	Legal defeasance may occur. Legal defeasance removes the issue from the issuer's balance sheet and frees the issuer from any indenture terms (including security pledges). It occurs when the issuer places in an escrow account an amount of money or U.S. government securities sufficient to match the remaining interest and principle payments of the current issue.
DEFEASANCE WITHOUT TAX CONSEQUENCE	**Other**	Legal defeasance may occur and issuer's legal counsel's opinion states that bondholders will not recognize income for federal tax purposes as a result of the defeasance. Legal defeasance removes the issue from the issuer's balance sheet and frees the issuer from any indenture terms (including security pledges). It occurs when the issuer places in an escrow account an amount of money or U.S. government securities sufficient to match the remaining principle and interest payments of the current issue.

AFTER ACQUIRED PROPERTY CLAUSE	**Other**	Property acquired after the sale of current debt issues will be included in the current issuer's mortgage. Normally found in utility issuers with blanket mortgages.
ECONOMIC COVENANT DEFEASANCE	**Other**	Gives the issuer the right to defease indenture covenants. If exercised, this would free the issuer from the covenants set forth in the indenture or prospectus, but leaves them liable for the remaining debt. This type of defeasance may have tax consequences for the bond holders.
SUBSIDIARY GUARANTEE	**Other**	Subsidiary guarantees the payment of interest and/or repayment of principal for the parent's debt issues.

APPENDIX II: Definition of Variables

Variable Name	Description / Compustat Data Items
Size	Log(data199*data25)
MarkettoBook	Log(data6–data60+data199*data25)/data6
Lagged Stock Return	Log (1+Stock return in the past month)
StockVolatility	Log 1+Standard deviation of daily stock returns in the past 180 days)
ROA	data13/data6
Leverage	(data9+data34)/data6
Interest Coverage	data178/data15 +1
Interest Coverage(0-5%)	interest coverage if 0<= interest coverage < 5%, 0 otherwise
Interest Coverage(5-10%)	interest coverage if 5%<= interest coverage < 10%, 0 otherwise
Interest Coverage(10-20%)	interest coverage if 10%<= interest coverage < 20%, 0 otherwise
Interest Coverage(>20%)	interest coverage if 20%<= interest coverage, 0 otherwise
Δreturn	Change of month return in month t
Δvolatility	Change of stock volatility in month t
Coupon	Coupon rate (percentage) of the issue
IssueSize	log(face value (mil.) of the issue)
Callable	Dummy for the issue being callable
TTM	log (months to maturity of the issue)
Term sprd210	Difference in yields on the 10-year and 2-year treasury bonds
CreditSprd	Difference in yields on BAA and AAA corporate bond
A+ Dummy	Dummy for S&P rating class "A+"
A Dummy	Dummy for S&P rating class "A"
A- Dummy	Dummy for S&P rating class "A"
BBB+ Dummy	Dummy for S&P rating class "BBB+"
BBB Dummy	Dummy for S&P rating class "BBB"
BBB- Dummy	Dummy for S&P rating class "BBB-"
BB+ Dummy	Dummy for S&P rating class "BB+"
BB Dummy	Dummy for S&P rating class "BB"
BB- Dummy	Dummy for S&P rating class "BB-"
B+ Dummy	Dummy for S&P rating class "B+"
B Dummy	Dummy for S&P rating class "B"
B- Dummy	Dummy for S&P rating class "B-"
CCC+ Dummy	Dummy for S&P rating class "CCC+"
CCC Dummy	Dummy for S&P rating class "CCC"
CCC- Dummy	Dummy for S&P rating class "CCC-"
A	Dummy for S&P rating class "A-" to "A+"
BBB	Dummy for S&P rating class "BBB-" to "BBB+"
BB-lr	Dummy for S&P rating class "BB+" or below

Appendix III: Calculation of Vega and Delta Measures

This appendix explains how the Delta and Vega measures used in this paper have been calculated using the Core and Guay (2002) approximation method. We use Execucomp data, which gives the realizable value (the potential gains from exercising all options on the fiscal year end price) and the number of options separately for both exercisable and unexercisable options, and also details of the current year's option grant.

We separately compute the incentives for the three components of option portfolio: option grants during the year, (remaining) portfolio of unexercisable options, and portfolio of exercisable options.

- For the current year's grant, all of the data required to compute incentives are given, and hence incentives can be computed easily.
- For the (remaining) portfolio of unexercisable options, and portfolio of exercisable options, we estimate the average exercise price and time to maturity (based on Core and Guay (2002)) separately for both portfolios.

We compute the average exercise price in two steps. First, we divide the realizable value by the number of options, which gives the average of (stock price – exercise price). We then subtract this number from the stock price to arrive at the average exercise price.

For exercisable options, we set the time to maturity as three years less than the time to maturity of the current year's options grants, or 6 years if no grant was made in the current year. For unexercisable options, we set the time to maturity equal to one year less than the time to maturity of the current year's options grants, or 9 years if no grant was made in the current year.

The actual formulae used to calculate the option value, Delta, and Vega are based on Black and Scholes (1973) model for valuing European call options, as modified by Merton (1973), to account for dividend payouts.

Value $= S e^{-dT} N(Z) - X e^{-rT} N(Z - \sigma T^{0.5})$

Delta = the sensitivity of the option value w.r.t. a 1% change in stock price

$= 0.01 e^{-dT} N(Z) S$

Vega = the sensitivity of the option value w.r.t. a 0.01 change in stock volatility

$= 0.01e\text{-}dT N'(Z) T^{0.5} S$

where

$Z = [ln(S/X) + T(r-d+0.5*\sigma^2)] / [\sigma T^{0.5}]$

S = price of the underlying stock

X= exercise price of the option

T = time to maturity of the option in years

r = log of risk-free interest rate

d = dividend yield

σ = expected stock-return volatility over the life of the option

$N(\,)$ = cdf of standard normal distribution

$N'(\,)$ = pdf of standard normal distribution

We multiply the Delta and Vega by the number of options to obtain the total dollar values of Delta and Vega from the option portfolio. The Delta of the stock portfolio equals the number of shares owned x 0.01 x stock price. The Vega of the stock portfolio is assumed to be zero as Guay (1999) finds that this value is insignificant compared to the Vega from options. CEO Vega, therefore, is the Vega of the option portfolio. CEO Delta is the sum of Deltas of the option portfolio and the stock portfolio.

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TABLE I. ISSUE CHARACTERISTICS

	Issuance Period			Full Sample
	90 - 94	95 - 99	00 - 03	80 - 03
Industry				
Industrial	68.6%	86.3%	77.7%	78.8%
Utility	31.4%	13.7%	22.3%	21.2%
Issue Characteristics				
Offering yield (%)	8.07	7.72	6.77	7.68
Offering Amount ($M)	153.6	247.3	537.8	292.2
Ave. Time to Maturity (months)	178.1	166.4	122.6	158.9
Ave. Coupon Rate (%)	8.34	8.23	7.47	8.07
Time to Maturity (Yrs)				
0 - 10	47.5%	64.6%	75.5%	62.1%
10 - 20	26.9%	17.0%	14.3%	19.3%
21 - 30	15.7%	10.3%	6.6%	11.0%
31 - 40	9.1%	5.4%	2.8%	5.9%
41 - 50	0.8%	1.7%	0.7%	1.1%
51 - 100	0.1%	0.7%	0.1%	0.4%
Missing	0.0%	0.3%	0.0%	0.1%
Perpetual	0.0%	0.1%	0.1%	0.0%
Security Level				
Senior Secured	27.6%	7.6%	7.8%	13.7%
Senior	55.2%	66.8%	75.6%	65.5%
Senior Subordinate	9.7%	18.4%	12.0%	14.1%
Junior	0.0%	0.0%	0.0%	0.0%
Junior Subordinate	0.2%	0.5%	0.0%	0.3%
Subordinate	0.1%	0.0%	0.0%	0.0%
None	7.3%	6.7%	4.6%	6.3%
Missing	0.0%	0.0%	0.0%	0.0%
Moody's Rating				
Investment Grade	69.7%	48.5%	61.7%	58.3%
Below Investment Grade	22.1%	45.6%	34.0%	35.5%
Missing or NR WR	8.2%	6.0%	4.2%	6.2%
Callable				
N	60.5%	31.0%	19.4%	37.0%
Y	39.5%	69.0%	80.6%	63.0%
Putable				
N	98.6%	95.2%	98.7%	97.1%
Y	1.4%	4.8%	1.3%	2.9%
Redeemable				
N	52.4%	27.8%	17.1%	32.6%
Y	47.6%	72.2%	82.9%	67.4%
All	3,261	4,755	2,709	10,725

TTABLE II. COVENANT INCIDENCE AND INDEX CONSTRUCTION

Category	Provision	Issuance Period					Full Sample
		80 - 84	85 - 89	90 - 94	95 - 99	00 - 03	80 - 03
Event	stock_transfer_sale_disp	2.6%	3.0%	3.2%	10.7%	10.0%	7.8%
	change_control_put_provisions	0.0%	20.3%	25.9%	46.8%	42.4%	37.5%
	rating_decline_trigger_put	0.0%	1.7%	3.9%	2.6%	2.1%	2.7%
Default	cross_acceleration	37.7%	38.7%	42.7%	67.5%	56.7%	55.5%
	cross_default	9.6%	9.3%	23.4%	3.1%	2.4%	9.0%
Investment	liens	4.4%	14.7%	7.9%	10.6%	7.0%	9.3%
	fixed_charge_	0.0%	0.0%	0.2%	1.2%	0.1%	0.6%
	after_acquired_property_clause	0.0%	0.4%	19.0%	1.4%	0.0%	5.7%
	asset_sale_clause	50.0%	63.3%	71.0%	92.1%	93.9%	84.0%
	consolidation_merger	51.8%	64.2%	71.6%	92.1%	93.2%	84.1%
	investments	0.0%	5.8%	6.8%	5.3%	3.0%	5.2%
	maintenance_net_worth	0.0%	19.0%	2.2%	1.3%	0.6%	2.9%
	security_pledge	5.3%	7.1%	25.8%	7.0%	6.8%	12.0%
	transaction_affiliates	0.9%	11.1%	18.7%	40.2%	28.2%	28.7%
Dividend	dividends_rel	37.7%	33.8%	32.8%	31.5%	16.1%	28.4%
	non-div restricted_payments	3.5%	10.5%	18.3%	40.9%	30.0%	29.3%
Financing	funded_debt	1.8%	2.7%	6.1%	2.5%	1.0%	3.1%
	indebtedness	1.8%	15.3%	22.2%	42.8%	33.1%	32.2%
	leverage_test	0.0%	0.0%	0.0%	0.5%	0.1%	0.2%
	sales_leaseba	20.2%	12.9%	32.1%	43.8%	42.2%	37.4%
	negative_pledge_covenant	25.4%	23.1%	49.5%	65.6%	64.9%	57.1%
	net_earnings_test_issuance	0.0%	0.4%	19.0%	1.6%	0.0%	5.7%
	senior_debt_issuance	1.8%	1.8%	1.0%	3.1%	0.5%	1.8%
	stock_issuance_issuer	0.0%	1.5%	5.3%	15.1%	7.3%	9.3%
	subordinated_debt_issuance	0.9%	5.2%	6.9%	8.7%	7.2%	7.5%
	borrowing_restricted	0.0%	0.0%	0.3%	0.5%	0.1%	0.3%
	preferred_stock_issuance	0.0%	3.8%	8.4%	17.7%	12.8%	12.7%
	subsidiary_guarantee	0.0%	0.0%	3.6%	15.2%	11.2%	9.7%
Total Number of Bonds		114	1145	3490	5183	3119	13051

TABLE III. NUMBER OF FIRMS AND ISSUES, PERCENTILES OF COVENANT PROTECTION INDEX

The table presents the following summary statistics for the years 1990 to 2002 as found in the sample: the average number of non-financial firms and bond issues; the 10%, 25%, 50%, 75% and 90% percentiles of the Bond Protection Index J (total number of covenants) and W (number of categories that have restrictive covenants in the indenture) of issues in the sample each year. Maximum J among issues in each year is also presented[1].

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Number of Firms	122	171	264	338	344	380	445	473	330	317	291	277	238
Number of Issues	238	428	706	927	956	1078	1227	1380	1061	1129	1081	1080	927
Issues/firm	2.0	2.5	2.7	2.7	2.8	2.8	2.8	2.9	3.2	3.6	3.7	3.9	3.9
10% percentile of J	1	1	2	2	3	3	3	3	3	3	3	3	3
25% percentile of J	2	3	3	3	4	4	4	4	4	4	4	4	4
50% percentile of J	4	4	4	4	4	5	5	5	5	5	5	5	5
75% percentile of J	5	5	5	5	5	6	6	6	5	5	5	5	5
90% percentile of J	6	6	7	9	10	10	11	11	8	7	7	7	6
Maximum J	12	14	14	14	14	15	15	15	15	15	14	14	14
10% percentile of W	1	1	1	1	2	2	2	2	2	2	2	2	2
25% percentile of W	1	2	2	2	2	2	2	2	2	2	2	2	2
50% percentile of W	2	2	2	2	3	3	3	3	3	3	3	3	2
75% percentile of W	3	3	3	3	3	3	3	3	3	3	3	3	3
90% percentile of W	3	3	4	5	5	5	5	5	4	4	4	4	3

[1] Maximum W among issues in each year is always 5, and minimum J and W are always 0. These numbers are omitted.

TABLE IV. THE BONDHOLDER PROTECTION INDEX AND CREDIT SPREAD

Reported are regression coefficients plus their t-statistics in parentheses of regressing monthly corporate bond spreads on the Bondholer Protection Index J and W (see Table 4 for a description), a constant (omitted), plus a set of controls (see Appendix II for description of each control variable). Results using two methodologies are reported. Model 1-4 are Fama - MacBeth regression results with mean and time-series standard deviation of the 142 monthly estimates of coefficients. Model 5-8 are estimates from Panel Regression. The t-statistics are corrected for heteroskedasticity, and clustering among bonds issued by the same issuer. After excluding financial firms (Fama-French industry groups 44-47), my sample includes an average of 940 bonds per year from 1990 to 2002, with on average 3.03 corporate bond issues per firm.

	AFTER ISSUANCE							
	Fama-MacBeth				Panel			
VARIABLE	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8
J	-0.032				-0.062			
	(-9.01)				(-7.83)			
W		-0.067				-0.120		
		(-8.26)				(-6.75)		
Dummy (W=1)			0.013	0.004			-0.190	-0.192
			(0.23)	(0.07)			(-1.16)	(-1.18)
Dummy (W=2)			-0.096	-0.103			-0.255	-0.261
			(-1.88)	(-2.10)			(-1.54)	(-1.57)
Dummy (W=3)			-0.139	-0.148			-0.321	-0.326
			(-2.91)	(-3.23)			(-1.95)	(-1.99)
Dummy (W=4)			-0.233				-0.554	
			(-4.79)				(-3.07)	
Dummy (W=5)			-0.141				-0.745	
			(-1.89)				(-4.1)	
Dummy (W=4,5)				-0.305				-0.647
				(-7.10)				(-3.71)
Size	-0.084	-0.081	-0.083	-0.081	-0.013	-0.004	-0.007	-0.004
	(-9.73)	(-9.46)	(-9.87)	(-9.74)	(-0.59)	(-0.17)	(-0.32)	(-0.2)
Market to Book	-0.182	-0.188	-0.188	-0.188	-0.323	-0.334	-0.329	-0.332
	(-12.0)	(-12.1)	(-12.4)	(-12.4)	(-8.29)	(-8.45)	(-8.48)	(-8.57)
Lagged Stock Return	-0.403	-0.403	-0.412	-0.399	-0.687	-0.689	-0.690	-0.688
	(-5.35)	(-5.38)	(-5.52)	(-5.39)	(-8.73)	(-8.69)	(-8.7)	(-8.67)
StockVolatility	2.653	2.683	2.627	2.660	4.308	4.323	4.289	4.288
	(14.72)	(14.63)	(13.91)	(14.54)	(18.84)	(18.81)	(18.86)	(18.96)
ROA	-0.964	-0.930	-0.792	-0.923	-0.224	-0.216	-0.171	-0.196
	(-4.49)	(-4.41)	(-3.81)	(-4.33)	(-0.51)	(-0.49)	(-0.39)	(-0.45)
Leverage	0.404	0.417	0.457	0.429	0.606	0.620	0.608	0.616
	(7.09)	(7.15)	(7.11)	(7.19)	(3.16)	(3.23)	(3.19)	(3.24)
Interest Coverage(0-5%)	-0.028	-0.030	-0.030	-0.029	-0.028	-0.031	-0.031	-0.031
	(-4.01)	(-4.47)	(-4.30)	(-4.11)	(-2.06)	(-2.24)	(-2.23)	(-2.24)
Interest Coverage(5-10%)	-0.002	-0.003	-0.003	-0.002	-0.002	-0.003	-0.004	-0.004
	(-0.53)	(-0.76)	(-0.80)	(-0.51)	(-0.23)	(-0.38)	(-0.46)	(-0.42)

(CONTINUED ON THE NEXT PAGE)

Interest Coverage(10-20%)	0.009	0.008	0.008	0.009	0.010	0.009	0.009	0.009
	(3.00)	(2.84)	(2.67)	(2.88)	(1.75)	(1.6)	(1.55)	(1.59)
Interest Coverage(>20%)	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001
	(1.83)	(1.65)	(1.41)	(1.52)	(1.15)	(1.2)	(1.11)	(1.12)
Coupon	0.125	0.125	0.126	0.125	0.080	0.082	0.087	0.087
	(20.34)	(20.41)	(19.93)	(20.10)	(6.45)	(6.48)	(7.03)	(7.01)
Time to Maturity	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.003
	(4.61)	(4.56)	(4.79)	(4.74)	(3.15)	(3.17)	(3)	(3.09)
IssueSize	-0.016	-0.019	-0.017	-0.018	0.017	0.007	0.012	0.007
	(-1.76)	(-2.12)	(-1.96)	(-1.98)	(0.61)	(0.26)	(0.47)	(0.27)
Callable	0.321	0.319	0.305	0.306	0.359	0.351	0.362	0.353
	(19.23)	(18.98)	(18.78)	(18.47)	(10.65)	(10.4)	(11.14)	(10.96)
A+ Dummy	-0.020	-0.026	-0.020	-0.022	0.041	0.031	0.034	0.036
	(-1.17)	(-1.52)	(-1.17)	(-1.31)	(0.89)	(0.65)	(0.7)	(0.74)
A Dummy	0.025	0.028	0.027	0.026	0.115	0.120	0.112	0.112
	(1.20)	(1.40)	(1.35)	(1.29)	(1.88)	(1.95)	(1.91)	(1.93)
A- Dummy	0.067	0.073	0.072	0.071	0.160	0.166	0.154	0.156
	(2.77)	(3.07)	(3.12)	(3.18)	(2.81)	(2.97)	(2.67)	(2.71)
BBB+ Dummy	0.164	0.174	0.169	0.163	0.215	0.230	0.223	0.226
	(6.33)	(6.94)	(6.75)	(6.64)	(3.4)	(3.63)	(3.41)	(3.47)
BBB Dummy	0.319	0.328	0.328	0.323	0.376	0.394	0.385	0.391
	(10.46)	(10.87)	(10.70)	(10.66)	(5.76)	(6.2)	(5.85)	(5.92)
BBB- Dummy	0.617	0.620	0.598	0.610	0.678	0.690	0.679	0.683
	(15.98)	(16.17)	(16.30)	(15.72)	(8.21)	(8.52)	(8.06)	(8.13)
BB+ Dummy	1.532	1.524	1.464	1.532	1.580	1.563	1.584	1.575
	(19.75)	(19.75)	(22.46)	(20.02)	(11.54)	(11.58)	(11.32)	(11.36)
BB Dummy	1.861	1.842	1.836	1.850	1.931	1.891	1.936	1.907
	(22.36)	(22.13)	(21.43)	(21.88)	(16.11)	(16.05)	(15.48)	(15.53)
BB- Dummy	1.899	1.875	1.883	1.887	2.165	2.106	2.181	2.141
	(32.94)	(33.32)	(32.20)	(32.90)	(16.5)	(16.34)	(15.83)	(16.41)
B+ Dummy	2.550	2.537	2.534	2.541	2.615	2.568	2.648	2.606
	(31.84)	(31.66)	(30.36)	(31.11)	(18.51)	(18.43)	(17.87)	(18.29)
B Dummy	2.587	2.566	2.581	2.576	2.813	2.745	2.838	2.780
	(40.42)	(40.21)	(37.59)	(38.42)	(17.87)	(17.49)	(16.99)	(17.08)
B- Dummy	3.252	3.241	3.224	3.239	3.559	3.511	3.588	3.536
	(26.49)	(26.59)	(26.82)	(26.59)	(18.41)	(18.1)	(18.38)	(17.82)
Adj. R2	79.1%	79.1%	79.4%	79.2%	72.1%	72.0%	72.1%	72.0%
No. of Months	142	142	142	142	142	142	142	142
Ave. No. of Obs.(Monthly)	488	488	485	485	-	-	-	-
No. of Obs. (Full Sample)	73294	73294	73294	73294	73294	73294	73294	73294

TABLE V. THE SPREAD-PROTECTION RELATIONSHIP – AT ISSUANCE AND AFTER ISSUANCE

Reported are regression coefficients plus their t-statistics in parentheses of regressing monthly corporate bond spreads on the Covenant Protection Index J and W (see Table 4 for a description), a constant (omitted), plus a set of controls (omitted. See Appendix II for description of each control variable). Model 1-2 are estimates of Panel Regression (with Issuer Fixed Effect) of credit spread at the issuance time of each bond. Therefore there is one observation for each of the 1648 bonds which have complete data for the estimation. For comparison purpose, estimation results using after-issuance time series of credit spreads are reported in column M3 and M4 below. The t-statistics are corrected for heteroskedasticity, and clustering among bonds issued by the same issuer.

	At Issuance		After Issuance	
VARIABLE	M1	M2	M3	M4
J	**0.044**		**-0.039**	
	(3.16)		**(-3.92)**	
W		**0.050**		**-0.059**
		(2.18)		**(-3.05)**
Issuer Fixed Effect	Yes	Yes	Yes	Yes
Adj. R2	80%	80%	78%	78%
No. of Obs.	1648	1648	73294	73294

TABLE VI. MATCHING EXPERIMENT

Estimated mean difference in credit spreads between bonds that are perfectly matched on issuer, time, credit rating, bond type, security type, redemption type, callable, putable and sinking funds, with time-to-maturity, coupon and issue size controlled in a regression framework. Mean difference for each combination of the two bonds' protection levels is captured by a dummy and the coefficients for the dummies are reported .

	Higher W		
	1	2	3
Lower W=0	-0.184	-0.911	-0.207
	(-3.25)	(-3.47)	(-1.26)

TABLE VII. EXOGENOUS SHOCKS AND CREDIT SPREAD CHANGE

PANEL A. INDUSTRY-WIDE NEGATIVE SHOCKS

Reported are regression coefficients plus their t-statistics in parentheses of regressing corporate bond spread changes during the months in which industry-wide negative shocks to the equity market take place, on the Covenant Protection Index J and W (see Table 4 for a description), a constant(omitted), plus a set of controls (Omitted. See Appendix II for description of each control variable). Rating and industry dummies are included in the model but not reported. After excluding financial firms (Fama-French industry groups 44-47), the sample includes 2,307 bond months which have non-missing data for credit spread changes and other controls for the estimation. The t-statistics are corrected for heteroskedasticity, and allow for clustering among bonds issued within the same industry.

Variable	**M1**	**M2**	**M3**	**M4**
W	-0.047		-0.047	
	(-1.86)		(-2.36)	
W2		-0.488		-0.488
		(-3.76)		(-4.64)
Industry Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Adj. R2	19.0%	19.6%	19.0%	19.6%
N	2307	2307	2307	2307

TABLE VII. EXOGENOUS SHOCKS AND CREDIT SPREAD CHANGE

PANEL B. THE "9/11" SHOCK

Reported are regression coefficients plus their t-statistics in parentheses of regressing corporate bond spread changes between 2001/8 and 2001/10 on the Covenant Protection Index J and W (see Table 4 for a description), a constant (omitted), plus a set of controls (omitted. See Appendix II for description of each control variable). Rating and industry dummies are included in the model but not reported. After excluding financial firms (Fama-French industry groups 44-47), the sample includes 1,257 bonds which have non-missing data for credit spread changes and other controls for the study period. The t-statistics are corrected for heteroskedasticity, and allow for clustering among bonds issued within the same industry (model 1,3 and 5) or clustering among bonds issued by the same issuer (model 2,4 and 6).

Variable	M 1	M 2	M 3	M 4	M 5	M 6
Constant	0.173	0.173	0.282	0.282	0.536	0.536
	(2.18)	(2.32)	(1.99)	(2.21)	(2.58)	(3.17)
W			-0.052	-0.052		
			(-1.13)	(-0.97)		
Dummy (W=2)					**-0.447**	**-0.447**
					(-1.91)	**(-2.44)**
Dummy (W=3)					**-0.474**	**-0.474**
					(-1.92)	**(-2.29)**
Dummy (W=4,5)					**-0.437**	**-0.437**
					(-1.74)	**(-1.87)**
Δ Return	-1.258	-1.258	-1.247	-1.247	-1.263	-1.263
	(-2.41)	(-3.67)	(-2.36)	(-3.61)	(-2.45)	(-3.7)
Δ Volatility	4.006	4.006	4.079	4.079	3.951	3.951
	(2.05)	(2.77)	(2.08)	(2.8)	(2.09)	(2.88)
Rating Dummies	YES	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES	YES
Adj. R2	39.4%	39.4%	39.6%	39.6%	40.4%	40.4%
N	1257	1257	1257	1257	1257	1257

TABLE VIII. CEO INCENTIVE AND BONDHOLDER PROTECTION

PANEL A. SUMMARY STATISTICS

	N	Mean	Min	P25	Median	P75
Delta (Million $)	38802	0.43	0.00	0.08	0.19	0.46
Vega (Million $)	38802	0.08	0.00	0.02	0.05	0.10
Log(Market Cap)	38802	8.73	4.29	7.98	8.78	9.53
Leverage	38802	0.33	0.00	0.26	0.33	0.39
J	38802	5	0	4	4	5
W	38802	3	0	2	2	3
Rating (3='AA+' - 17='B-')	38802	8	3	6	8	10

PANEL B. FAMA-MACBETH REGRESSION ANALYSIS

Reported are regression coefficients plus their t-statistics in parentheses of regressing monthly corporate bond spreads on the Covenant Protection Index J and W (see Table 4 for a description), measures of CEO incentives - Delta and Vega (See Appendix III for definitions), a constant (omitted), plus a set of controls (omitted. See Appendix II for description of each control variable). The t-statistics are corrected for heteroskedasticity, and clustering among bonds issued by the same issuer.

Variable	M1	M2	M3	M4
Delta	**0.007**	0.007	0.006	**0.009**
	(1.67)	(1.59)	(1.39)	**(1.92)**
Vega	**0.304**	**0.266**	**0.359**	**0.367**
	(3.83)	**(3.35)**	**(3.53)**	**(5.26)**
Vega*(W=2)			-0.013	
			(-0.11)	
Vega*(W=3)				**-0.282**
				(-5.59)
Vega*(3<=W<=5)			**-0.296**	
			(-2.96)	
Vega*(4<=W<=5)				**-0.740**
				(-2.54)
W		**-0.021**	**-0.010**	-0.005
		(-6.74)	**(-2.35)**	(-1.22)
Ave. Adj. R2	84.5%	84.5%	84.6%	84.7%
No. of Months	40	40	40	40
Ave. No. of Obs.	789	788	786	786
Total No. of Obs.	38802	38802	38802	38802

FIGURE 1: CROSS-SECTION AND TIME VARIATION OF J AND W