Strategic Behavior, Financing, and Stock Returns

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Abstract

In this paper I analyze how debt structure and the strategic interaction between shareholders and creditors in the event of default affect expected stock returns. By endogenizing shareholders' decision to default, the model generates new predictions linking firm characteristics to expected stock returns through an intuitive economic mechanism. In particular, the model predicts that expected stock returns are higher for firms that face high debt renegotiation difficulties, and that have a large fraction of secured or convertible debt. Expected stock returns are lower for firms whose shareholders maintain strong bargaining power, and for firms subject to high liquidation costs. Using a large sample of publicly traded US firms between 1985 and 2005, I present new evidence on the link between debt structure, renegotiation frictions, and stock returns, which is supportive of the model's predictions.

Keywords: Debt Structure, Strategic Behavior, Stock Returns, Renegotiation, Default
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1 Introduction

A firm usually defaults when shareholders are unable to make contractual payments to debtholders. Shareholders may, however, also have incentives to act strategically to induce default and recover a substantial fraction of firm value, even though they are residual claimants. While a number of theoretical papers explicitly consider this strategic default and the interaction between claimholders in the context of optimal capital structure and corporate bond pricing, very little is known on how default and the strategic behavior of claimholders affect stock returns.[1] Furthermore, corporate debt often includes conversion rights and covenants that secure part of the debt. Existing research remains silent on the implications of these covenants for stock return. In this paper I attempt to extend this research by investigating how such covenants and the strategic behavior of shareholders upon default influence expected stock returns. More specifically, I analyze how secured and convertible debt and possible renegotiation frictions affect expected stock returns.

To shed new light on the influence of debt structure on the strategic behavior in default and on stock returns, I extend a contingent claims model by looking at the type of debt and at renegotiation frictions. I then analyze the implications for stock returns. The model allows for renegotiation of debt contracts between shareholders and bondholders, and permits to analyze the role of renegotiation frictions and debt structure. The model generates predictions regarding liquidation costs, bargaining in default, and expected stock returns that are consistent with the available empirical evidence. In addition, the model generates new predictions regarding the relation between the type of debt, renegotiation frictions, and stock returns.

More specifically, the predictions are as follows. Expected stock returns are higher for firms that face higher renegotiation frictions, that have a greater fraction of their debt that is secured, or that have more convertible debt in their capital structure. These effects are stronger for firms close to default. The explanation for this is that large renegotiation frictions and a large fraction of secured debt reduce the ability of shareholders to extract firm value from creditors upon default and hence increase the risk of equity. By contrast, expected stock returns are lower for distressed firms whose shareholders have large bargaining power and for firms facing high liquidation costs. In these situations, shareholders will be able to extract more firm value from creditors upon default, hence decreasing equity risk. Using a large sample of publicly traded US firms between 1985 and 2005, I present new evidence on the link between renegotiation frictions, debt structure, and stock returns, which is supportive of the model's predictions.

The economic mechanism that is driving the results is simple. Shareholders have decision

[1] Recent empirical work shows that bargaining in default between claimholders plays an important role in determining yield spreads and is economically significant for stock returns [see Davydenko and Strebulaev (2006), Garlappi et al. (2006), and Garlappi and Yan (2007)].

rights regarding the firm's policy choices and make operating decisions. To the extent that these operating decisions affect the risk of a firm's cash flow, these decisions should impact a firm's equilibrium rate of return. One important such decision is whether or not to service debt payments. If shareholders decide not to service debt even though they could, they default strategically. Shareholders will however only default strategically when they are better off in default than they would be if the firm remained a going concern. A number of empirical papers provide evidence that shareholders receive a considerable fraction of firm value upon default.[2] Therefore, depending on the amount of cash flow that shareholders expect to receive in default, they will decide to default strategically or not. Since renegotiation frictions, bargaining power and debt structure directly affect this decision to default, they should also impact stock returns.

To test my model, I form a large sample of publicly traded US firms for the period from 1985 to 2005. I then test the predictions from the model using Fama and MacBeth (1973) methodology and non-parametric portfolio analysis. I find that the data are consistent with the model's predictions. First, I find that stock returns are lower for firms with high liquidation costs and for firms whose shareholders have high bargaining power. This finding is more pronounced for firms close to distress and it supports the intuition that creditors' willingness to negotiate is higher when costs of liquidation or the bargaining power of shareholders are high. These results are consistent with the findings by Garlappi et al. (2006).

Second, I find that stock returns are increasing with renegotiation frictions. When renegotiation of debt contracts becomes more difficult, shareholders anticipate this and require a higher return as compensation for the foregone share they would receive in renegotiation. This effect is present for both distressed and healthy firms.

Third, stock returns are increasing with the fraction of firms' debt that is secured. A higher proportion of secured debt reduces the ability of shareholders to extract firm value from creditors and thus increases the risk of equity. This effect is more important for distressed than healthy firms.

Finally, I find that stock returns are increasing with the fraction of firm's debt that is convertible. A higher proportion of convertible debt increases the optimal conversion threshold for convertible bond holders because they do not want to loose their coupon payments. This emphasizes the convex part of the payoff function, hence increasing the risk for shareholders.

To provide further support for these results, I subject the main findings to a number of robustness checks. Notably, I address a possible endogeneity bias regarding secured and convertible debt, and investigate whether the results hold with alternative proxies for financial distress. I find that the main results are robust to alternative measures of distress and that they are unlikely driven by endogeneity.

Overall, this paper contributes in at least two dimensions. First, while prior research

[2] Early contributions include Gilson et al. (1990), Franks and Torous (1989), and Asquish et al. (1994).

offers some insights on the implications of bargaining in default and liquidation costs on stock returns, this is the first paper that investigates the effect of renegotiation frictions on expected stock returns. Whereas good proxies for bargaining power still are missing, a number of empirical and theoretical papers have documented firm characteristics that proxy for renegotiation frictions [see e.g. Gilson et al. (1990), Betker (1995)]. These frictions turn out to be an important determinant of stock returns and need to be taken into account in order to determine how investors are affected when a firm heads towards bankruptcy.

Second, instead of investigating firms with a simple capital structure, this paper analyzes the pricing implications in the presence of more complex capital structures, including secured and convertible debt. Empirical evidence points to a relation between leverage and expected stock returns. This study investigates how a special *type* of debt affects expected stock returns and shows that the allocation of property rights implicit in debt covenants is important for stock returns. To the best of my knowledge, this is the first paper that investigates systematically the effects of secured and convertible debt financing on default and expected stock returns.

This paper is most closely related to the paper by Garlappi et al. (2006). They investigate the relation between default probabilities and stock returns in the light of strategic behavior of shareholders. They find that expected stock returns are not generally positively related to default probabilities. They argue that this is not violating the risk return trade-off, since shareholders with high bargaining power are able to extract rents from debtholders reducing the risk of default. Accordingly, they find that firms whose shareholders have high bargaining power earn lower returns. Conversely, firms whose shareholders have little or no bargaining power earn higher returns that tend to increase with the default probability.

This paper also continues a line of research that uses contingent claim methods to value corporate securities. Since the seminal works of Black and Scholes (1973) and Merton (1974), this approach has been extended into various directions in order to make the models more realistic. In particular, models were developed to look at the default of firms more closely [Leland (1994), Longstaff and Schwartz (1995), and Leland and Toft (1996)]. More recent models analyze the effects of strategic behavior of shareholders on asset prices [Anderson and Sundaresan (1996), Mella-Barral and Perraudin (1997), and Fan and Sundaresan (2000)]. Subsequent work extends this framework into various directions, such as renegotiation frictions [François and Morellec (2004)], optimal cash management policy [Acharya et al. (2006)], multiple creditors [Hege and Mella-Barral (2005)], liquidity risk [Ericsson and Renault (2006)], and optimal debt mix policy [Hackbarth et al. (2007)]. Finally, this paper extends the results by Davydenko and Strebulaev (2006) who explore the empirical relation between corporate debt prices and firm characteristics.

The remainder of the paper is organized as follows. Section 2 presents the model and derives empirical predictions. Section 3 discusses the empirical strategy and presents the data. Section 4 presents the main results. Section 5 contains robustness checks. Section 6 concludes.

2 Model and Empirical Predictions

Corporate debt often includes features such as conversion rights or debt covenants that secure part of the debt [see e.g. Mikkelson (1981), Leeth and Scott (1989), Loncarski et al. (2006)]. In this paper I extend the contingent claim framework of Fan and Sundaresan (2000) in order to account for this evidence. I focus on the effect of renegotiation frictions and debt structure on expected stock returns. The purpose is to derive testable implications for expected stock returns and to illustrate the logic and economic intuition underlying these implications.

2.1 Model Setup

Throughout the paper, managers act in the best interest of shareholders and investment policy is fixed. Assets are traded continuously in arbitrage free markets. The term structure is flat with riskless rate r at which investors may borrow and lend freely. Cash flows from operations are independent of capital structure choices and evolve according to a geometric Brownian motion with a constant growth rate $\mu > 0$ and a constant volatility σ, so that

$$dX_t = \mu X_t dt + \sigma X_t dB_t, \tag{1}$$

where B_t is a standard Brownian motion.

Because the firm pays taxes on corporate income, it has an incentive to issue debt. Once debt has been issued, shareholders have the option to default on the firm's debt obligation. If the firm defaults on its debt, it can be liquidated at a proportional cost $\alpha \in [0, 1]$. Debtholders have absolute priority in liquidation, leaving them with $(1 - \alpha)\Pi(X)$, where $\Pi(X)$ is the value of the unlevered firm at default. Moreover, costless renegotiation of the debt contract is possible, where the value of the firm is split between shareholders and creditors according to their bargaining power. In this simplest case, renegotiation will never fail since liquidation is costly whereas renegotiation is costless. In other words, debtholders accept to receive less than the contractual coupon to keep the firm a going concern.[3] Because creditors give up some firm value to shareholders in renegotiation, this can be viewed as a deviation from the Absolute Priority Rule (APR); a fact that has been documented empirically [Gilson et al. (1990), Franks and Torous (1989), and Asquith et al. (1994)].

Following Davydenko and Strebulaev (2006), suppose that renegotiation fails with probability q due to exogenous factors, in which case the claims are settled in bankruptcy accord-

[3] Introducing proportional renegotiation costs does not change the qualitative results as long as liquidation costs are larger than renegotiation costs. Intuitively, renegotiation costs reduce the amount of cash flow that is shared between shareholders and bondholders in renegotiation.

ing to the APR. The parameter q may measure the likelihood of a failure of an out-of-court workout, or the possibility that a Chapter 11 reorganization is converted into a liquidation procedure according to Chapter 7. Bris et al. (2007) show, for instance, that the identity of the judge matters whether there is an APR violation or not. Judges in Arizona systematically violate APR, while New York judges do so only on occasion.

Once renegotiation is initiated, shareholders and creditors play a Nash bargaining game with respective bargaining power η and $(1-\eta)$. When $\eta = 1$, equityholders have all the bargaining power and make take-it-or-leave-it offers to creditors. When $\eta = 0$, debtholders make take-it-or-leave-it offers to shareholders. The allocation of the renegotiation surplus between the firm's claimants with sharing rule θ is determined as follows. The incremental value for shareholders in bargaining with default threshold X_B is $\theta\Pi(X_B) - 0$, because the alternative to bargaining is liquidation, in which shareholders receive nothing. The incremental value for creditors is $(1-\theta)\Pi(X_B) - (1-\alpha)\Pi(X_B)$, since the alternative to bargaining is liquidation with costs α. Therefore, the sharing rule for the renegotiation surplus upon default satisfies

$$\theta^* = \arg\max_{\theta} \left\{ [\theta\Pi(X_B)]^{\eta} \left[(1-\theta)\Pi(X_B) - (1-\alpha)\Pi(X_B)\right]^{1-\eta} \right\}, \tag{2}$$

with the solution

$$\theta^* = \alpha\eta. \tag{3}$$

Equation (3) shows that shareholders receive more of the renegotiation surplus, the higher their bargaining power η and the higher the liquidation costs α. More specifically, they get $\alpha\eta\Pi(X_B)$ upon default if there is renegotiation. By contrast, bondholders receive $(1-\alpha\eta)\Pi(X_B)$ in renegotiation, and $(1-\alpha)\Pi(X_B)$ if renegotiation is not successful and the firm is liquidated.

The next three subsections analyze specific cases of this model.

2.2 Straight Debt

This subsection considers the case of a firm with outstanding equity and single risky perpetual debt with an instantaneous coupon c. I assume without loss of generality that this coupon c is constant. I do therefore not explicitly model the optimal amount of debt to issue, which is clearly an endogenous aspect of the model. Although my empirical work will try to take that endogeneity into account, the model is only a partial account of return determination.

Assuming a tax rate $\tau \in [0,1]$, the after-tax cash flow to shareholders is $\pi(X_t) = (X_t - c)(1-\tau)$. This after-tax cash flow plus the expected change in the value of equity must be equal to the required return for shareholders. The value of equity $E(X)$ therefore satisfies the following differential equation

$$\frac{1}{2}\sigma^2 X^2 E_{XX} + \mu X E_X + (1-\tau)(X-c) = rE, \tag{4}$$

where E_X and E_{XX} are the first and second derivatives of the equity value with respect to the state variable X. The general solution to this ordinary differential equation is

$$E(X) = AX^{\lambda_1} + BX^{\lambda_2} + (1-\tau)\left(\frac{X}{r-\mu} - \frac{c}{r}\right), \tag{5}$$

where A and B are constants, determined by boundary conditions, and where λ_1 and λ_2 are given by

$$\lambda_1 = \left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right) + \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}} > 0, \tag{6}$$

$$\lambda_2 = \left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right) - \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}} < 0. \tag{7}$$

The boundary conditions are given by the following equations:

$$\lim_{X\uparrow\infty} E(X)/X \leq \infty, \tag{8}$$

$$\lim_{X\downarrow X_B} E(X) = (1-q)\eta\alpha\frac{X_B}{r-\mu}(1-\tau), \tag{9}$$

$$\lim_{X\downarrow X_B} E_X(X) = (1-q)\eta\alpha\frac{1}{r-\mu}(1-\tau). \tag{10}$$

The expected value of equity upon default is $(1-q)\,\eta\alpha\,[X_B/(r-\mu)]\,(1-\tau)$ (value-matching condition, equation 9). This expected value shows that for a given default threshold X_B, higher bargaining power of shareholders η or lower renegotiation difficulties q imply a larger expected cash flow to shareholders.

I assume that the risk premium is exogenous in this model, hence, there is a one-to-one mapping between expected returns and the equity beta. To get predictions for expected stock returns, I derive the equity beta by applying Itô's lemma to the value of equity.

Shareholders have the option to default on the firm's debt obligation and choose the default threshold X_B that maximizes the value of equity. Using contingent claims techniques and the boundary conditions in equations 8 to 10, the optimization problem of the shareholders yields the following Proposition (see the Appendix 1).

Proposition 1: *Assume that the cash flow of the firm is described by equation (1). When shareholders choose the value-maximizing default threshold X_B, the value of equity is*

$$E(X;\alpha,\eta,q) = (1-\tau)\left[\frac{X}{r-\mu} - \frac{c}{r}\right] - (1-\tau)\left[\frac{c}{r}\frac{1}{\lambda-1}\right]\left(\frac{X}{X_B}\right)^{\lambda}, \tag{11}$$

the total value of the firm is

$$\begin{aligned} v(X;\alpha,\eta,q) \quad &= \quad (1-\tau)\frac{X}{r-\mu} - \alpha q\frac{X_B}{r-\mu}(1-\tau)\left(\frac{X}{X_B}\right)^{\lambda} \\ &\quad +\frac{\tau c}{r}\left(1-\left(\frac{X}{X_B}\right)^{\lambda}\right), \end{aligned} \tag{12}$$

and the value of debt is

$$D\left(X;\alpha,\eta,q\right)=\frac{c}{r}+\left[\left(1-(1-q)\eta\alpha-\alpha q\right)\frac{X_B}{r-\mu}\left(1-\tau\right)-\frac{c}{r}\right]\left(\frac{X}{X_B}\right)^{\lambda}, \tag{13}$$

where X_B is the endogenous triggering point of renegotiation,

$$X_B=\frac{r-\mu}{r}\frac{\lambda}{\lambda-1}\frac{c}{1-(1-q)\eta\alpha} \tag{14}$$

and λ is

$$\lambda=\left(\frac{1}{2}-\frac{\mu}{\sigma^2}\right)-\sqrt{\left(\frac{1}{2}-\frac{\mu}{\sigma^2}\right)^2+\frac{2r}{\sigma^2}}<0. \tag{15}$$

Moreover, the equity beta is given by

$$\beta_E=1+\frac{\left(1-\tau\right)\frac{c}{r}\left(1-\left(\frac{X}{X_B}\right)^{\lambda}\right)}{\left(1-\tau\right)\left(\frac{X}{r-\mu}-\frac{c}{r}\right)-\left(1-\tau\right)\frac{c}{r}\left(\frac{1}{\lambda-1}\right)\left(\frac{X}{X_B}\right)^{\lambda}}>1=\beta_X, \tag{16}$$

where β_X is the beta of the firm's cash flow and is normalized to 1.

Proposition 1 shows that the value of equity is composed of two parts. The first part is the after-tax present value of cash flows to shareholders ignoring the option to default. The second term captures the after-tax value of the option to default. Since the term in the square brackets is negative, the option to default increases the value of equity. Note also that higher liquidation costs or bargaining power increase the option value of defaulting and thus the value of equity. The value of debt is also composed of two parts. The first term reflects the value of risk free debt. The second term captures the change in the value of debt due to the option to default. For the equity beta, since the second part of the equation is positive, the beta of equity is larger than the normalized beta of the firm's cash flow. Note, too, that α, η, and q are between zero and one, and $-\sqrt{2r/\sigma^2}\leqslant\lambda<0$.

I first address the question of how renegotiation frictions affect equity value and stock returns by analyzing the derivative of $E(X,q)$ and $\beta_E\left(q\right)$. Suppose for instance, that renegotiation of debt contracts becomes more difficult (q increases). This could occur when debt is more dispersed or a greater fraction of debt is held publicly. Bolton and Scharfstein (1996) argue that the presence of many dispersed bondholders makes renegotiation difficult. Empirically, Asquith et al. (1994) and Gilson et al. (1990) document that about half of the firms attempting an informal distressed restructuring end up in Chapter 11, and relate the probability of bankruptcy to the complexity of the firm's debt structure. Intuitively we can thus argue that the value of equity decreases as the parameter q increases. Calculating the effect of a marginal increase of q on the value of equity, we find that it is negative. Note also that $\partial X_B/\partial q<0$, which means that the default threshold is decreasing with q. The reason for this is that shareholders are less likely to default strategically since they know that the probability of renegotiation failure increases, decreasing the expected value of equity.

When we look at the beta of equity, the sign of the impact of q is reversed ($\partial\beta/\partial q > 0$). This means that risk and therefore expected stock returns are an increasing function of renegotiation frictions. The intuition for this new prediction is as follows. Renegotiation frictions measure how easily renegotiation can be carried out. As argued above, if bond or stock ownership is dispersed, debt renegotiation is likely to be difficult and might fail. In such a case claims are liquidated according to the APR where shareholders receive nothing. By contrast, negotiation with only a small number of lenders and shareholders might be relatively easy and efficient, and shareholders will be able to extract rents from creditors. Therefore, higher renegotiation frictions represent a higher cash flow risk for shareholders. This is reflected in higher expected stock returns.

Indeed, going one step further, one may argue that this effect should be stronger for distressed firms. Consider a mature firm that has a low leverage and highly valued assets. Such a firm is unlikely to default, and the discussed effect regarding strategic default might be negligible. Conversely, the effect should be more important for distressed firms. Using cross derivatives, we see that $\partial^2\beta/\partial q\partial X < 0$ (see the Appendix 2). This means that the positive effect of the parameter q is stronger for low values of the state variable X. This leads to the first testable prediction.

> **Prediction 1:** *Firms that face high renegotiation frictions have higher expected stock returns. This effect is stronger for distressed firms.*

The two other parameters of interest are liquidation costs α and bargaining power of shareholders η. Taking derivatives of the equity beta with respect to those two parameters I get $\partial\beta/\partial\alpha < 0$ and $\partial\beta/\partial\eta < 0$. This means that expected stock returns are a decreasing function of liquidation costs and bargaining power of shareholders. In both cases, default is not equivalent to a zero payoff for shareholders, since they get a larger fraction of asset value upon default than they would get according to the APR. From the value-matching condition we see that the expected value of equity increases with α and η. This is reflected in lower risk and hence in lower expected stock returns. Thus, expected stock returns are lower for firms whose shareholders have high bargaining power and for which liquidation costs are high, corroborating the results by Garlappi et al. (2006).

2.3 Secured Debt

Secured debt makes up a large part of corporate debt and has received considerable attention in the literature. It has been argued that secured debt may increase firm value by limiting possible legal claims in bankruptcy [Scott (1977, 1979)] and that it reduces administrative and enforcement costs, prevents asset substitution and alleviates the underinvestment problem [Smith and Warner (1979a), Johnson and Stulz (1985)]. Morellec (2001) also shows that pledging part of the firm's assets as collateral to the debt contract by issuing secured debt increases firm value. He shows that, on one hand, secured debt prevents a firm from selling assets, increases its liquidation value and reduces the default probability. On the other hand, the security provision also limits the operating flexibility of the firm. The optimal pledge trades of these costs and benefits.

The wide use of secured debt has also been documented empirically. Barclay and Smith (1995), for instance, document that on average one third of a firm's debt is secured. Leeth and Scott (1989) report for a sample of small business loans that about sixty percent of the loans are secured by some type of collateral, and Houston and James (1996) find in their study on the mix of private and public debt that about 30 percent of debt is secured. Despite this considerable fraction of secured debt that firms tend to hold, existing models remain silent on implications of security provisions for stock returns. In addition, the valuation setting is often not rich enough to incorporate empirical regularities such as costly liquidation and the possibility of renegotiation. It is, however, likely that the proportion of secured debt that a firm has is an important determinant of what shareholders can expect to receive in default.[4]

When debt is secured, debtholders require the firm to pledge a part of the firm's assets as collateral. Equityholders cannot sell the collateral or increase its risk without agreement of debtholders. In this way equityholders can commit to a low risk operation policy, resulting in higher debt prices, a lower risk premium and hence in lower cost of borrowing. Note that there are administrative, processing and monitoring expenses associated with secured debt borrowing. Smith and Warner (1979b) argue that these expenses are paid by lenders, although the costs will be transferred to equityholders as higher borrowing costs.

Take the model from the previous subsection. Suppose now that debtholders can secure part of their debt with a collateral which they can access at zero cost. The contract specifies that upon default, debtholders get a fraction $\pi \in [0, 1]$ of the unlevered firm value for certain, and over the residual value they negotiate with shareholders.[5] In such a setup, the amount of collateral relates naturally to the proportion of secured debt. The higher the collateral specified by π, the greater the fraction of secured debt.

Denote by X_S the endogenous default threshold. Suppose furthermore that some other frictions impede renegotiation as discussed in the straight debt case. Since shareholders have no claim on the assets that are used as collateral for the secured debt upon default, the expected value of equity is reduced by the fraction of the firm's secured assets. Compared with the straight debt case, shareholders get a smaller cash flow (by $(1 - \pi)$) upon default, all else equal.

[4] See Fan (2000) for an alternative way of how to introduce secured debt into a contingent claim framework.

[5] In reality, shareholders can choose at least to some extent what fraction of debt they want to secure. This means that π is endogenous. I address this in the empirical analysis.

Shareholders' objective is again to choose the default threshold X_S that maximizes the value of equity. Solving the optimization problem yields Proposition 2 (see the Appendix 1).

Proposition 2: *Assume that the cash flow of the firm is described by equation (1). When a firm has secured debt outstanding and shareholders choose the value-maximizing default threshold X_S, the value of equity is*

$$E^S(X;\pi) = (1-\tau)\left[\frac{X}{r-\mu} - \frac{c}{r}\right] - (1-\tau)\left[\frac{c}{r}\frac{1}{\lambda-1}\right]\left(\frac{X}{X_S}\right)^{\lambda}, \tag{17}$$

the value of the firm is

$$v^S(X;\pi) = (1-\tau)\frac{X}{r-\mu} - (1-\pi)\alpha q\frac{X_S}{r-\mu}(1-\tau)\left(\frac{X}{X_S}\right)^{\lambda} + \frac{\tau c}{r}\left(1-\left(\frac{X}{X_S}\right)^{\lambda}\right), \tag{18}$$

and the debt value is

$$D^S(X;\pi) = \frac{c}{r} + \left[(1-(1-q)\eta\alpha(1-\pi) - \alpha q(1-\pi))\frac{X_S}{r-\mu}(1-\tau) - \frac{c}{r}\right]\left(\frac{X}{X_S}\right)^{\lambda}, \tag{19}$$

with the default threshold X_S given by

$$X_S = \frac{r-\mu}{r}\frac{\lambda}{\lambda-1}\frac{c}{1-(1-q)\eta\alpha(1-\pi)}, \tag{20}$$

and λ defined as in Proposition 1. Moreover, the equity beta is given by

$$\beta_E^S = 1 + \frac{(1-\tau)\frac{c}{r}\left(1-\left(\frac{X}{X_S}\right)^{\lambda}\right)}{(1-\tau)\left(\frac{X}{r-\mu} - \frac{c}{r}\right) - (1-\tau)\frac{c}{r}\left(\frac{1}{\lambda-1}\right)\left(\frac{X}{X_S}\right)^{\lambda}}.$$

As argued by Morellec (2001), secured debt reduces the cost of borrowing for bondholders in two ways. First, it reduces the default probability since it prevents the firm from selling the secured assets. Moreover, shareholders will less likely default strategically because there is less scope for equityholders to exploit debtholders in renegotiation. Second, security provisions reduce bankruptcy costs in the event of default because of lower enforcement cost. In this case, the reduction in default costs is $\alpha q\pi[X_S/(r-\mu)](1-\tau)(X/X_S)^{\lambda}$ (see equation 18 for firm value).

Regarding the empirical prediction, if a larger proportion of debt is secured, shareholders will be able to extract less from creditors in case of renegotiation. This implies that the value of equity is decreasing with π, i.e. $\partial E_S/\partial\pi < 0$. Moreover, the default threshold X_S is a decreasing function of the fraction of secured debt because shareholders will wait longer before they default. Taking the derivative of beta with respect to π, we see that β_E^S is an increasing function of the fraction of secured debt π ($\partial\beta_E^S/\partial\pi > 0$). A higher fraction of secured debt reduces the ability of shareholders to extract firm value from creditors and thus increases the risk of equity, especially for firms that are close to default ($\partial^2\beta/\partial\pi\partial X < 0$). From this discussion it follows that we should observe higher stock returns for firms with a larger fraction of debt that is secured.

> **Prediction 2:** *Firms that have a large fraction of debt that is secured have higher expected stock returns. This effect is stronger for distressed firms.*

2.4 Convertible Debt

Corporate debt routinely incorporates conversion options, and firms with capital structures that include convertible debt claims represent a broad spectrum of firm size and industry classification [see Mikkelson (1981) and Loncarski et al. (2006)]. There are numerous theoretical explanations for the use of convertible debt, including information asymmetry problems [Stein (1992)], agency costs [Jensen and Meckling (1976)], and the sequential-financing hypothesis [Mayers (1998)].

A standard approach for valuing convertible debt is to decompose the convertible bond value into an investment and option component [see e.g. Ingersoll (1977)]. The idea behind this decomposition is that both components can be priced separately, where the investment component is typically obtained as the value of straight debt of an appropriate benchmark firm. This practical approach, however assumes implicitly that the conversion right does not affect the default strategy. Since the goal of this paper is to analyze the economic mechanism of shareholders' choice to default, the interaction between convertible debtholders and equityholders must be considered. I therefore follow a different strategy by extending the straight debt model from the previous subsection and by adding convertible debt to the capital structure.

Consider a firm with outstanding equity, perpetual straight debt with coupon cs and a perpetual convertible bond with instantaneous coupon cc as long as the firm is solvent and no conversion takes place. I assume for simplicity that straight debt and convertible debt have the same priority. This assumption is not critical for the subsequent analysis, and other types of seniority can also be incorporated and would lead to qualitatively similar results [see Lyandres and Zhdanov (2006)].

In this model the fraction of convertible debt is a direct function of the two coupons cs and cc. Upon default, the holders of straight and convertible debt are entitled to payoffs of $cs/(cs + cc)\epsilon(X_B)$ and $cc/(cs + cc)\epsilon(X_D)$, where $\epsilon(X_D)$ is the fraction of firm value that goes to the two classes of bondholders. Convertible debtholders can convert their bond into a fraction γ of equity. This value of equity corresponds to the value of equity right after conversion when there is only straight debt outstanding.

Since the payoff from the conversion increases with the firm's cash flow, it will be optimal to convert when the state variable X hits an upper bound X_C. Assume for simplicity that there is no call provision, that the whole debt issue must be converted at the same point in time, and that there is no conversion before default.

To value equity, straight and convertible debt I must consider lower and upper boundary conditions. Denote by X_D the renegotiation trigger value. The boundary conditions for the value of equity in default are thus identical to the case of straight debt. If the cash flow hits the upper bound, debtholders lose their coupon claim and get the conversion value $\gamma\left(\upsilon(X_C)-D\left(X_C\right)\right)$, where $\upsilon\left(X_C\right)$ is the value of the firm right *after* conversion (with equity and only straight debt outstanding), and $D\left(X_C\right)$ is the value of straight debt *after* conversion. Shareholders receive the remaining firm value, namely $(1-\gamma)\left(\upsilon(X_C)-D\left(X_C\right)\right)$. Thus, after conversion the firm is leveraged with only straight debt, corresponding to the case discussed in subsection 2.2.

To obtain the value of convertible debt, define $\varphi = cc/(cs+cc)$. If there is renegotiation in default, convertible debtholders bargain with straight bondholders on their side as one party against shareholders and recover $\varphi\left(1-\eta\alpha\right)\left[X_D/(r-\mu)\right](1-\tau)$ of firm value. If there is liquidation, convertible bondholders share the unlevered firm value after liquidation costs and get $\varphi\left(1-\alpha\right)\left[X_D/(r-\mu)\right](1-\tau)$. Upon conversion, convertible bondholders obtain a fraction γ of the value of equity after conversion, or $\gamma\left(\upsilon(X_C)-D\left(X_C\right)\right)$.

Shareholders' objective is again to maximize the value of equity. Solving the optimization problem yields Proposition 3 (see the Appendix 1).

Proposition 3: *Assume that the cash flow of the firm is described by equation (1). When a firm has convertible debt outstanding and shareholders maximize the value of equity, it is given by*

$$\begin{aligned} E^C(X;\gamma) &= (1-\tau)\left[\frac{X}{r-\mu}-\frac{(cs+cc)}{r}\right] \\ &\quad -AR\left((1-(1-q)\,\alpha\eta)\frac{X_D}{r-\mu}(1-\tau)-\frac{(cs+cc)(1-\tau)}{r}\right) \\ &\quad +AC\left((1-\gamma)\left(\upsilon(X_C)-D\left(X_C\right)\right)-(1-\tau)\frac{X_C}{r-\mu}+\frac{(cs+cc)(1-\tau)}{r}\right), \end{aligned} \tag{21}$$

and the value of convertible debt is given by

$$\begin{aligned} D^C(X;\gamma,\varphi) &= \frac{cc}{r}+AR\left((1-(1-q)\,\alpha\eta-q\alpha)\varphi\frac{X_D}{r-\mu}(1-\tau)-\frac{cc}{r}\right) \\ &\quad +AC\left(\gamma\left(\upsilon(X_C)-D\left(X_C\right)\right)-\frac{cc}{r}\right), \end{aligned} \tag{22}$$

where AR and AC are

$$AR = \left(\frac{X}{X_D}\right)^{\lambda_2} \frac{X^{\lambda_1-\lambda_2} - X_C^{\lambda_1-\lambda_2}}{X_D^{\lambda_1-\lambda_2} - X_C^{\lambda_1-\lambda_2}}, \quad (23)$$

$$AC = \left(\frac{X}{X_C}\right)^{\lambda_2} \frac{X^{\lambda_1-\lambda_2} - X_B^{\lambda_1-\lambda_2}}{X_C^{\lambda_1-\lambda_2} - X_D^{\lambda_1-\lambda_2}}, \quad (24)$$

and λ_1 *and* λ_2

$$\lambda_2 = \left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right) - \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}} \quad (25)$$

$$\lambda_1 = \left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right) + \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}}. \quad (26)$$

The value of equity consists of three parts. The first part is the after-tax present value of cash flows to shareholders ignoring the option to default or to convert. The AR-term is the current value of a binary up-and-out put option that pays one unit at a future point in time when the asset value hits the default barrier X_B without having crossed the conversion threshold X_C before. Accordingly, the AC-term can be seen as the present value of a binary down-and-out call option that pays one unit only if X hits X_C and no default has occurred.

As noted by Hennessy and Tserlukevich (2006), endowing bondholders with an option to convert their bond into equity results in additional strategic interdependence between shareholders and creditors. Thus, the optimal default and conversion barriers result from a Nash game between equity- and debtholders. Equityholders choose the equity value maximizing default strategy given their beliefs about the bondholder's conversion strategy. Accordingly, debtholders select a conversion strategy to maximize the convertible debt value given their beliefs about shareholders' default strategy.

These restrictions can be expressed by the two smooth-pasting conditions $\frac{\partial E}{\partial X}\big|_{X=X_D} = (1-q)\,\eta\alpha(1/(r-\mu))\,(1-\tau)$ and $\frac{\partial D^C}{\partial X}\Big|_{X=X_C} = \gamma\frac{\partial(v(X_C)-D(X_C))}{\partial X_C}$. I obtain the optimal (Nash equilibrium) default and conversion thresholds by jointly solving the two smooth-pasting conditions numerically. I solve for these thresholds using the following baseline assumptions: $\alpha = 5\%$, $\gamma = 0.5$, $r = 6\%$, $\mu = 2\%$, $cs = 5$, $\sigma = 30\%$, $q = 0.5$, $\eta = 0.5$ and $\tau = 0.3$. In this base case environment, renegotiation fails half of the time, shareholders and bondholders have the same amount of bargaining power[6], and bondholders receive half of the equity at conversion. I have verified that the results are not sensitive to the choice of these parameter values.

[6]This number is very close to recent evidence by Morellec et al. (2008).

As in the previous subsections, the equity beta is then given by

$$\beta_E^C = \left[\begin{array}{c} (1-\tau)\frac{1}{r-\mu} - \frac{\partial AR}{\partial X}\left((1-(1-q)\,\alpha\eta)\frac{X_D}{r-\mu}(1-\tau) - \frac{(cs+cc)(1-\tau)}{r}\right) \\ +\frac{\partial AC}{\partial X}\left((1-\gamma)\left(\upsilon(X_C) - D\left(X_C\right)\right) - \frac{X_C}{r-\mu}(1-\tau) + \frac{(cs+cc)(1-\tau)}{r}\right) \end{array} \right] \frac{X}{E} \tag{27}$$

where

$$\frac{\partial AR}{\partial X} = \left(\frac{X}{X_D}\right)^{\lambda_2} \frac{1}{X}\left(\frac{\lambda_1 X^{\lambda_1-\lambda_2} - \lambda_2 X_C^{\lambda_1-\lambda_2}}{X_D^{\lambda_1-\lambda_2} - X_C^{\lambda_1-\lambda_2}}\right) \tag{28}$$

and

$$\frac{\partial AC}{\partial X} = \left(\frac{X}{X_C}\right)^{\lambda_2} \frac{1}{X}\left(\frac{\lambda_1 X^{\lambda_1-\lambda_2} - \lambda_2 X_D^{\lambda_1-\lambda_2}}{X_C^{\lambda_1-\lambda_2} - X_D^{\lambda_1-\lambda_2}}\right). \tag{29}$$

The after-tax present value of cash flows for shareholders (first term in the bracketed expression) is positive. The terms $\partial AR/\partial X$ and $\partial AC/\partial X$ are the sensitivities of the barrier options with respect to the state variable X and can be interpreted similarly to the delta of an option. Since the $AR-$term represents a put option, its derivative with respect to X is negative. Conversely, the $\partial AC/\partial X$-term is positive like the delta of a plain vanilla call option. The term in parentheses following $\partial AR/\partial X$ is negative, and it is made up of the after-tax cash flows to shareholders upon default minus what is paid out to both classes of bondholders. The term in parentheses following $\partial AC/\partial X$ is also negative and consists of the value of equity after conversion minus the after-tax present value of the cash flow plus the proceeds paid out to bondholders.

Figure I shows comparative static results for the value of equity and the equity beta with a varying proportion of convertible to total debt φ. In this figure, I offset an increase in the convertible debt coupon by an proportional decrease of the straight debt coupon.

< INSERT FIGURE I ABOUT HERE >

From Figure I we see that the equity beta is increasing with φ. The reason for this is that the higher fraction of convertible debt shifts the concave part of the convertible debt payoff function towards the right. Convertible bondholders will convert later, because they do not want to loose the coupon payments. This right-shift of the concave part of the payoff function emphasizes the lower, convex part of the payoff function and makes the payoff to shareholders less concave. This is analogous to increased risk for shareholders, and therefore, expected returns should be higher for firms with a high proportion of convertible debt.

Prediction 3: *Firms that have a large fraction of convertible debt in the capital structure have higher expected stock returns.*

3 Variables, Empirical Strategy, and Data

In the following sections I test the main predictions of the model and find compelling evidence in favor of the model's predictions.

3.1 Variables

Existing empirical and theoretical studies of corporate reorganization and capital structure motivate the choice of my empirical proxies. To proxy for renegotiation frictions, I use the number of institutional shareholders. I measure secured debt as the fraction of secured to total debt. I also measure convertible debt as the fraction of convertible to total debt. I proxy for liquidation costs with intangible assets, and finally, research and development expenses to total assets and CEO shareholding are my proxies for bargaining power in potential renegotiations.

3.1.1 Renegotiation frictions

Renegotiation frictions indicate how easily debt renegotiations are carried out. They influence the probability of a successful out-of-court workout, and they may also hinder the Chapter 11 renegotiation. Debt renegotiations are especially difficult, when they involve many parties with diverse interests [e.g. Hege and Mella-Barral (2005) and Bolton and Scharfstein (1996)]. Bolton and Scharfstein (1996) argue, for instance, that dispersed public debt makes debt more difficult to renegotiate because of free-rider problems. Moreover, Bris et al. (2006) find that the time that a Chapter 11 firm needs to confirm a reorganization plan is positively and significantly related to the number of creditors. Much like the dispersion of bondholders, the dispersion of equityholders also hinder renegotiation due to coordination problems. To capture this idea, I follow Davydenko and Strebulaev (2006) and use the number of institutional shareholders as a proxy for renegotiation frictions. More specifically, I use the normalized number of shareholders, defined as the logarithm of the number of different institutional shareholders divided by the logarithm of the market value of the firm's equity.[7]

3.1.2 Secured and convertible debt

Since secured debt is directly observable, I measure secured debt by the proportion of secured to total debt. Similarly, I measure convertible debt by the proportion of total convertible to total debt.

[7] I also use debt dispersion as a proxy for renegotiation frictions and get qualitatively similar results. I measure dispersion as one minus the proportion of debt maturing within one or three years to total debt. The idea is that other debt than short term debt is likely to be more dispersed which makes debt renegotiation harder.

3.1.3 Liquidation costs

Liquidation costs are the surplus that can be preserved through renegotiation. I use asset intangibility as a measure of liquidation costs. The asset tangibility measure was introduced by Berger et al. (1996) and recently used by Almeida and Campello (2007) to investigate the effect of financial constraints on corporate investment and by Garlappi et al. (2006) in their study on default risk and stock returns. It is a firm-level proxy for expected value of assets in liquidation. Berger et al. (1996) find that a dollar of book asset value generates, on average, 71.5 cents in exit value for total receivables, 54.7 cents for inventory and 53.5 cents for capital. They also add cash to the tangible part of assets. The measure of tangibility is thus a weighted average of receivables, inventories, net power, plant and equipment, and cash, scaled by total book assets. In actual tests, I use one minus this measure of tangibility, which is positively related to liquidation costs.[8]

3.1.4 Bargaining power

Following Davydenko and Strebulaev (2006), the proxy for bargaining power is CEO shareholding, the sum of common and restricted shares held by a CEO divided by the common shares outstanding of the firm. Management, and especially the CEO, plays an important role in any negotiation. For instance, management has the exclusive right to propose a plan of reorganization within 120 days of entering Chapter 11. Moreover, during that period it can allocate the creditors to a particular class, which may be critical in gaining consent to a reorganization plan [Franks and Torous (1989)]. Betker (1995) shows that a 10% increase in CEO shareholdings increases equity deviations from the APR in Chapter 11 by as much as 1.2% of firm value. The rationale is that the more shares managers hold in the company, the more effort they will exert to extract rents from creditors in the case of financial distress.

In addition, and following Garlappi et al. (2006), I use R&D expenses to total assets as a measure for bargaining power of shareholders. The intuition is that firms with high research and development costs are vulnerable to liquidity shortages in financial distress. These firms are thus more likely to have cash flow problems, which puts them in a disadvantaged bargaining position with creditors.

3.2 Identifying distressed firms

The prediction of the model is that the effect of renegotiation frictions and secured debt is more pronounced for firms close to default. To investigate this prediction, I try to identify firms with high default risk and compare the results to the results for a sample of healthy firms.

[8] The fact that the business cycle might have an influence on the value of tangible assets in default is acknowledged but not explicitly taken into account in the empirical analysis.

There are several ways to proxy for a firm's level of financial distress and its probability of bankruptcy in the short run. The different models are usually based on accounting data or on stock market data and are mainly constructed using multiple discriminant analysis [Altman (1968)] or multiple choice analysis [Zmijewski (1984)].

Following the literature on bankruptcy prediction, I use Altman's Z-score to identify firms in financial distress. [9] I calculate the Z-score for every firm-month observation. Then, I pool all observations and split the sample into three groups based on the Z-score. Accordingly, the group of firms with the lowest Z-score contains the firms that are most likely to experience financial distress.[10] For robustness, and to provide further support for my results, I redo part of the analysis using two alternative measures of distress. The first measure is the distance to default constructed along the lines of Vassalou and Xing (2004), Bharath and Shumway (2004) and Duffie et al. (2007). The second proxy is the probability of bankruptcy based on Zmijewski's (1984) multiple choice analysis. The results using these two alternative measures of distress are very similar to the ones I obtain using the Z-score.

3.3 Empirical strategy

I test the predictions of the model with a regression based and a non-parametric portfolio approach. I carry out the regression-based approach using the Fama and MacBeth (1973) methodology. In the first stage, I regress cross-sectionally monthly returns on a set of firm characteristics. In the second stage, I take the average of the time-series coefficients and calculate corresponding t-statistics.

For the portfolio analysis, I pool in each year all firms and divide the pool into quantiles based on a proxy for renegotiation frictions, secured debt, convertible debt, liquidations costs, or bargaining power. I then report average monthly returns and t-statistics for these portfolios, as well as the return differences between the quantiles. Since there is a number of known determinants of average returns, I also calculate characteristic-adjusted returns. I use the procedure of Daniel et al. (1997) to adjust individual stock returns for size, book-to-market, and momentum.

[9] The Z-score is calculated as follows:

$$Zscore = 1.2 * \frac{WorkingCapital}{TotalAsset} + 1.4 * \frac{retainedEarnings}{TotalAssets} + 3.3 * \frac{EBIT}{TotalAssets} + 0.6 * \frac{MarketValueEquity}{TotalLiabilities} + \frac{Sales}{TotalAssets}.$$

[10] Splitting the sample in three groups is admittedly arbitrary. This choice, however, tries to balance two offsetting concerns. On the one hand, I wish to capture firms with a Z-score low enough to identify firms that are most likely in financial distress. On the other hand, making too many groups reduces the sample significantly and makes the portfolio construction unreliable. Choosing three groups strikes a balance between the two concerns. Although the results in the paper are presented with splits into three groups, in unreported tables I replicate most findings using more or less groups, and the results are qualitatively similar.

3.4 Data

I employ data from a panel of US firms over the period from 1985 to 2005. Monthly stock market data comes from the Center for Research in Security Prices (CRSP), annual financial statement data is from Standard & Poor's Compustat (numbers in parentheses refer to the item number in the Compustat database), institutional ownership data comes from Thomson Financial Ownership Database, and executive compensation is from the ExecuComp database.

My sample includes all firms listed on the NYSE, AMEX, and NASDAQ with sharecodes 10 and 11 that are contained in the intersection of the CRSP monthly returns file and the Compustat industrial annual file. To ensure that the accounting variables are known before the returns they are used to explain, I match the accounting data for all fiscal year-ends in calendar year $t-1$ with the returns for July of year t to June of year $t+1$ [Fama and French (1992)].

For size I use CRSP market equity for June of year t. Book equity is total assets (6) minus total liabilities (9+34). The book-to-market ratio is calculated by dividing book equity by Compustat market equity, which is Compustat stock price (199) times shares outstanding at fiscal year end (25). Leverage is the ratio of book liabilities (total assets (6) minus book equity) to total market value of the firm. Momentum is the firm's past 12-month average return, skipping the most recent month.

I exclude financial firms (SIC codes between 6000 and 6999) and regulated firms (SIC codes above 9000) because their accounting data do probably not have the same meaning as for non-financial or non-regulated firms due to statutory capital requirements and other restrictions. Moreover, a firm must have information on the book value of assets, the market value of equity, momentum, total debt (9+34), secured debt (241), cash (1), power, plant and equipment (8), convertible debt (79), and institutional ownership to be included in the sample. Finally, I winsorize all variables at the one percent level in each tail to reduce the impact of outliers.[11] Table I contains a summary and the definitions of the variables used in the empirical analysis.

< INSERT TABLE I ABOUT HERE >

3.5 Descriptive Statistics

The full final sample consists of 575'146 firm-month observations, except for the variable *ceoshareholding*. This variable is constructed using the ExecuComp database that only begins in 1992. Table II contains summary statistics for the main variables.

[11] Note that winsorizing the independent variables has no effect on the results of the portfolio analysis, since extreme observations fall into the same groups before and after winsorization. For the Fama and MacBeth (1973) analysis, the results remain qualitatively the same without any winsorization.

< INSERT TABLE II ABOUT HERE >

The mean return (*return*) is positive with 1.05 percent and the median return is zero. This indicates a positively skewed distribution of stock returns, which is consistent with empirical findings. The proxy for liquidation costs, *intangibles,* has a mean value of 46.4 percent. On average, firms have 58 institutional shareholders, with a median value of 22. The average amount of equity held by a CEO is 12.4 percent compared to a median holding of 3.9 percent. The value is higher than the one reported by Davydenko and Strebulaev (2006). This discrepancy, however, may be attributed to differences in the samples. The mean amount of secured debt held by firms is 36 percent which is consistent with the number reported by Barclay and Smith (1995). Firms hold on average 6.8 percent convertible debt, which is substantially lower than the amount of secured debt. The mean market leverage is about 25 percent, and the average return over the past twelve month is 1.3 percent.

Since the type of debt financing plays an important role in this paper, Table III sheds some light on what kind of firms have secured and convertible debt outstanding.

< INSERT TABLE III ABOUT HERE >

Panel A contains descriptive statistics for firms without secured debt, and Panel B for firms with a positive amount of secured debt outstanding. Firms without secured debt tend to be larger and hold more cash. By contrast, firms with secured debt in their capital structure tend to have a higher leverage, higher asset volatility, a higher probability of default, and a higher book-to-market ratio.

Panel C and Panel D contain the same statistics for convertible debt. Firms without any convertible debt are smaller, have less cash, less debt, a lower leverage and a lower expected default frequency. The asset volatility and the book-to-market ratio are very similar across the firms with and without convertible debt outstanding. It thus seems that convertible bonds do not reduce the incentives to increase the risk of the companies in my sample of firms.

4 Results

This section reports the main results. The first subsection documents evidence supporting the model's prediction using the standard Fama and MacBeth (1973) estimation methodology. The second subsection uses the portfolio approach to test the predictions of the model.

4.1 Fama and MacBeth Analysis

To examine the relation between renegotiation frictions, debt structure, and stock returns, I perform regression analysis using the Fama and MacBeth (1973) methodology. In each month, I regress monthly returns on firm characteristics, and then I average the time-series of the estimated coefficients and calculate the corresponding t-statistics. While the portfolio analysis in the next subsection presents a non-parametric test of the predictions derived from the model, a regression analysis provides multivariate evidence of the economic mechanisms that are at play. These regressions allow to analyze the relation between firm characteristics and average stock returns without imposing any restrictions on portfolio construction, and allow to control for additional alternative explanations.[12]

Table IV presents regressions for various specifications. In each estimation, I control for firm characteristics that are known to affect stock returns. These include the size of a firm, the book-to-market ratio, momentum returns, and leverage.

< INSERT TABLE IV ABOUT HERE >

Panel A of Table IV presents the coefficient estimates for the full sample, absolute values of t-statistics in parentheses, and in brackets the changes in average monthly returns when the independent variable increases by one standard deviation.

The model predicts that firms subject to high renegotiation frictions have higher expected returns. The reason for this is that if renegotiation is likely to fail, shareholders will recover less firm value upon default compared to a situation when renegotiation is successful. This increases the risk of equity and hence expected returns. We should therefore observe a positive sign for the coefficient of renegotiation frictions. Using the proxy *shareholders* for renegotiation frictions, this prediction is confirmed in Panel A of Table IV. In column 1 the coefficient of *shareholders* is positive and statistically significant at the five percent level. Furthermore, the coefficient and its statistical significance remain unaltered when I add secured debt (column 3), convertible debt (column 5) or both to the regression (column 6). These first results are consistent with the model's prediction.

The same result holds for secured debt. The coefficient of *secured* is positive and statistically significant in column 2. Adding *shareholders* (column 3) or *convertible* (column 6) does not change the coefficient nor the significance. This result is strongly supportive of the model's prediction saying that firms with a higher fraction of secured debt have higher average returns because secured debt reduces the amount of firm value that is subject to renegotiation upon default.

The results in Panel A of Table IV also support the model's third prediction regarding convertible debt.[13] The coefficient of *convertible* is positive and statistically significant in

[12] I also estimate pooled regressions with monthly dummy variables and obtain very similar results. Moreover, including the value-weighted CRSP market index does not change the results either. Estimation results are available on request.

[13] Since a large proportion of firms reports zero convertible debt, I include a dummy variable equal to one if the firm has convertible debt, and zero otherwise. I do this in order to isolate the effect of a higher *proportion* of convertible debt on stock returns (as predicted by the model).

columns 4 to 6, indicating that firms with a higher proportion of convertible debt earn, on average, higher stock returns. Once more, the results remain unchanged when I include *secured* or *shareholders* in the regression.

While the effects are statistically significant for all variables of interest, the economic impact is rather moderate for the full sample. An increase of one standard deviation in the variable *shareholders* increases average stock returns by 13 basis points per month. Accordingly, increasing the fraction of secured debt by one standard deviation leads, on average, to a 7 basis points increase in monthly stock returns. Finally, increasing the fraction of convertible debt by one standard deviation increases average stock returns by 11 basis points per month.

Note also that the estimated coefficients of the control variables are consistent with available empirical evidence. Indeed, the *book-to-market* ratio has a strong positive effect on stock returns, reflecting the value premium. Also, *leverage* has a negative impact on stock returns. Moreover, *size* and *momentum* are not significant. For *size* this is consistent with evidence showing that the size effect disappears in more recent sample periods.

The model further predicts that the effects of renegotiation frictions and secured debt are more relevant for firms close to financial distress. To investigate this additional prediction, I classify firms into three groups based on their Z-score. Then, I define the group of firms with low Z-scores as distressed firms. Accordingly, the group of firms with high Z-scores contains healthy firms. Panel B of Table IV presents estimation results for distressed firms and Panel C reports results for healthy firms.

From Panel B we see that the main results remain unaltered for distressed firms. More specifically, the coefficient of shareholders is positive and statistically significant. Note that with respect to the full sample, the coefficient increases slightly in magnitude, leading to a more pronounced economic impact on stock returns by about 3 basis points per month. *Secured* is also positive and statistically significant. Consistent with the model's prediction, the economic effect of *secured* is twice as high for distressed firms than for the full sample firms. The effect of secured debt on stock returns thus seems to be more important for distressed firms than for the average sample firm. Finally, the coefficient of convertible is also positive, but looses slightly significance for distressed firms.

When I contrast these results with the group of healthy firms (Panel C), we observe differences for the coefficients of *secured* and *shareholders*. For healthy firms, the coefficient of *secured* looses its statistical significance. Moreover, the coefficient of *shareholders* also looses statistical and economic significance. Overall, these results support the prediction that the effect of renegotiation frictions and secured debt on stock returns is more pronounced for distressed than for healthy firms. The coefficient of *convertible* remains positive and significant for healthy firms.

Taken together, the regression-based approach provides evidence that renegotiation frictions and the debt structure have a systematic positive effect on stock returns. Consistent with the predictions from the model, stock returns are higher for firms facing large renegotiation difficulties, and having more secured and convertible debt outstanding. In the following, I further investigate the relation between renegotiation frictions, debt structure, and stock returns using the portfolio approach.

4.2 Portfolio Analysis

The main advantage of the portfolio approach is that it does not presuppose any functional-form relationship between the variables. Moreover, the portfolio approach is a standard method in the empirical asset pricing literature to analyze the impact of firm characteristics on stock returns, and therefore allows comparison with this related work.

At the end of each June from 1985 to 2005, I pool all firms and sort stocks into five quantiles based on a proxy for liquidation cost, renegotiation frictions, bargaining power, and the fraction of secured or convertible debt. I then report average monthly returns for these portfolios, as well as the return difference between the first and fifth quantile together with the t-statistic.

Since there are a number of known determinants of average returns, I also report characteristic-adjusted returns. I use the procedure of Daniel et al. (1997) to adjust individual stock returns for size, book-to-market, and momentum. I take all firms listed on the NYSE, AMEX, and NASDAQ with sharecodes 10 and 11 that are contained in the intersection of the CRSP monthly returns file and the Compustat industrial annual file. Each month, I sort these firms in the sample into size quintiles, and then within each size quintile into book-to-market quintiles. I divide each of these 25 portfolios further into quintiles based on the firm's past 12-month average return, skipping the most recent month. I average stocks within each of these 125 portfolios to form a benchmark that is subtracted from each individual stock's return. Accordingly, the expected value of this excess return is zero if size, book-to-market, and momentum completely describe the cross-section of expected returns.

Table V reports the results for the portfolio analysis. In each panel, I report the raw returns and below the characteristic-adjusted average returns, as well as the average spread between the first and the fifth quantile along with its t-statistic. In order to test the predictions from the model, I report results for distressed firms as well as results for healthy firms based on the Z-score.

< INSERT TABLE V ABOUT HERE >

Panel A of Table V contains portfolio returns for distressed firms based on the Z-score, and Panel B contains the portfolio returns for healthy firms.

The model predicts that firms subject to high renegotiation frictions have higher expected returns. We should thus observe that the average return increases when going from quantile 1 (lowest renegotiation frictions) to quantile 5 (highest renegotiation frictions). Using the proxy *shareholders* for renegotiation frictions, this prediction is confirmed in Panel A of Table V. The monthly raw return increases from 0.767 percent in quantile 1 to 1.00 percent in quantile 5. The difference of 0.23 percentage points per month is statistically significant at the ten percent level. Adjusting the returns for book-to-market, size, and momentum effects does not change the result. The difference between quantile 1 and quantile 5 remains statistically significant.

Note also that the difference is economically large. Had an investor sold the portfolio in quantile 1 and invested the proceeds in the quantile 5 portfolio, this investor would have earned an excess return of 26 basis points per month (3 percent per year).

A similar result holds for secured debt. In Panel A, the average raw returns increase from 0.861 percent in quantile 1 to 1.158 percent in quantile 5, and the risk-adjusted return increases from -0.589 percent to -0.448 percent. The difference between quantile 1 and quantile 5 is statistically significant for the raw returns, not, however, for the risk-adjusted returns. Despite this, the result is generally supportive of the model's prediction regarding the relation between secured debt and stock returns. A higher fraction of secured debt generates higher average returns because secured debt reduces the amount of firm value that is subject to renegotiation upon default.

For convertible debt, the results are even stronger. The raw return increases from 0.06 percent (quantile 1) to 0.87 percent (quantile 5), and the risk-adjusted return increases from -1.42 percent to -0.40 percent. The differences are statistically significant and economically large. Going short the portfolio in quantile 1 and long the portfolio in quantile 5 would yield a excess return of 100 basis points per month (12 percent per year).

Strikingly, when we look at *secured* and *convertible* for healthy firms, this effect almost disappears. The average monthly return of quantile 1 is not statistically different from the average return of quantile 5 (raw and risk-adjusted returns). This is consistent with the conjecture that shareholders in distressed firms are more concerned about their stake in the firm upon default than shareholders in firms that do not have to fear immediate default. Shareholders in distressed firms will thus require a premium for their secured debt, which is reflected in higher average returns. For renegotiation frictions, the positive effect on average stock returns is also present in the group of healthy firms.

Two other predictions from the model are that firms that are subject to high liquidation costs, and firms whose shareholders have high bargaining power have lower expected returns. These predictions are consistent with the ones of Garlappi et al. (2006). The intuition for these predictions is that creditors are more likely to give up some firm value to shareholders if their alternative is to face high cost of liquidation or if shareholders have a lot of bargaining power. From shareholders' perspective, this reduces the risk of equity and hence expected returns.

Table VI shows results for *intangibles* as a proxy for liquidation costs and for *ceoshareholding* and *rd* as proxies for bargaining power. The data strongly support the model's prediction for *intangibles, rd,* and *ceoshareholding.* For liquidation costs, average monthly raw and risk-adjusted returns are significantly higher in the first quantile (low liquidation costs) compared to the fifth quantile (high liquidation costs).

< INSERT TABLE VI ABOUT HERE >

The same pattern emerges for the variable bargaining power, measured by *ceoshareholding.* Average returns (raw and risk-adjusted) are significantly higher in the first quantile compared to the fifth quantile (high bargaining power). Finally, the result also holds using *rd* as an alternative proxy for bargaining power. Average returns in the first quantile (*high* bargaining power) are significantly lower than in quantile 5 (*low* bargaining power). Overall, the results in Table VI support the model's predictions and are consistent with the results of Garlappi et al. (2006).

In sum, the portfolio analysis provides additional support for the model's predictions and underlines the results from the Fama and MacBeth (1973) analysis. The analysis shows that firms close to distress earn, on average, a higher return when renegotiation is difficult, when they have a large fraction of secured or convertible debt, low liquidation costs or low bargaining power.

4.3 Discussion

The analysis has shown so far that the strategic variables such as *shareholders*, *secure*, and *convertible* affect stock returns even after taking into account other variables (size, market, book-to-market ratio, and momentum) that are related to priced factors. A plausible reason put forth in this paper why these variables are relevant in explaining stock returns, is that they capture a different dimension of a firm's exposure to risk factors. From the model we know that this dimension relates to the strategic behavior of shareholders in default, and their possibilities to extract rents from creditors. This dimension becomes most relevant for firms in financial distress, and it seems that this effect is not subsumed or not correctly measured by the other variables accounting for the cross-section of expected stock returns. Thus, the effect explored in this paper does not identify a new priced factor, but rather points to an economic mechanism prevalent close to default and related to default risk that has not yet been explored.[14]

[14] One can also argue that empirically, the traditional variables that explain the cross-section of expected stock returns do not correctly measure a financially distressed firm's exposure to risk factors. The strategic variables proposed in this paper, however, capture exactly this mismeasured exposure to those factors. This explains their influence on stock returns. The model correctly predicts a deviation from a factor model and thus provides an economically intuitive mechanism and answer.

5 Robustness and Further Evidence

So far, the analysis has provided evidence on the relation between renegotiation frictions, debt structure, and stock returns. In this section I perform several robustness checks to further support the results presented so far.

5.1 Endogeneity Bias

A potential question about my inference is whether the proportion of secured and convertible debt could be determined endogenously. To explore the potential importance of this issue, I instrument for secured and convertible debt and implement a two-step GMM estimation. This estimator generates efficient estimates of the coefficients as well as consistent estimates of the standard errors [see Hayashi (2000)]. Ideally, the instrumental variables are independent of returns but are correlated with secured debt. I use income tax (16) over pretax income (170), capitalized lease obligations (84) over total assets, and current debt over total debt as instruments for secured and convertible debt. Panel A of Table VII reports the results of these estimations for secured debt, and Panel B of Table VII presents the results for convertible debt. The positive effect of the proportion of secured and convertible debt on stock returns is unaltered.

< INSERT TABLE VII ABOUT HERE >

The choice of instruments is motivated by Barclay and Smith (1995) and their analysis on the priority structure of corporate liabilities. Barclay and Smith (1995) use tax-loss carryforward and average tax rates to explain the fraction of secured debt held by firms and find that they are significantly related to the proportion of secured debt. Moreover, since tax rates are set by the federal or state government, it is likely that the resulting tax payments are exogenous to stock returns. Further, the amount of short term debt is more likely to be related to the cost of debt than to stock returns. If bond spreads are low, a firm might issue more public debt, which has usually longer maturity, thereby decreasing the proportion of short-term debt [(Davydenko and Strebulaev (2006)]. Further, Barclay and Smith (1995) find that the amount of capitalized leases of a firm is determined significantly whether an industry is regulated or not. This indicates that the amount of capitalized leases is at least to some extent a function of exogenous factors, and is unlikely to be related to stock returns.

The results in Panels A and B of Table VII confirm the results of the previous sections. In Panel A, the coefficient of secured debt is significantly different from zero in the group of distressed firms. Moreover, the coefficients are higher compared to the non-instrumented estimates of section 4, implying a larger economic impact of secured debt on stock returns (the coefficients rise from 0.003 to 0.009). Further, the values from Hansen's J-Statistic of overidentifying restrictions show that the joint null hypothesis that the instruments are valid cannot be rejected in column 1 and column 2. Finally, and as expected, the coefficient of *secured* is not significantly different from zero for the group of healthy firms. Again, this supports the prediction that the effect of secured debt on stock returns is more pronounced for distressed than for healthy firms.

The coefficient estimates for convertible debt are also positive and statistically significant at the one percent level for distressed firms, supporting the results of the Fama and MacBeth (1973) estimations and the portfolio analysis. For healthy firms, the coefficient of *convertible* is not significantly different from zero. These results strongly support the results from the previous subsections and the model's predictions. Finally, the values of the Hansen's J-Statistic of overidentifying restrictions are well above the critical level to reject instrument validity.

For renegotiation frictions, it is hard to think of a reason why institutional shareholding could be endogenous and negatively related to stock returns. Given the remarkable consistency of the results for the regression and portfolio analysis, I believe that they are unlikely driven by endogeneity.

The analysis using instrumental variables to instrument for the proportion of secured and convertible debt shows that the results in this paper are robust to an endogeneity bias. The coefficient estimates for secured and convertible debt are significant and similar to those of the Fama and MacBeth (1973) analysis of section 4.

5.2 Alternative Measures of Distress

Hitherto, the analysis shows that renegotiation frictions and debt structure have a statistically and economically significant impact on stock returns. The model predicts that this effect is reinforced for distressed firms. To provide further support for this prediction I use two alternative measures of distress. The first additional measure of distress is the *distance to default*, constructed along the lines of Bharath and Shumway (2004) and Duffie et al. (2007). It is computed numerically as

$$distance\ to\ default = \frac{\ln(V/F) + (\mu - 0.5\sigma_V^2)T}{\sigma_V\sqrt{T}}, \tag{24}$$

where V is the market value of assets, F is the face value of debt, μ is the expected asset growth, and σ_V is the volatility of firm value.[15] Roughly speaking, the *distance to default* is the number of standard deviations of asset growth by which a firm's market value of assets exceeds the face value of debt.[16] Duffie et al. (2007) find that the *distance to default* is economically important for explaining the term structure of default probabilities.

[15] I thank Sreedhar Bharath and Tyler Shumway for providing a SAS code to compute the distance to default.

[16] Please refer for computational details to Bharath and Shumway (2004) or Duffie et al. (2007).

To test the predictions, I construct two groups of firms based on the *distance to default*. I define firms with a below-median *distance to default* as distressed firms. Accordingly, firms with an above-median distance to default are healthy firms. Panel A of Table VIII contains the results from the portfolio analysis based on the *distance to default*.

< INSERT TABLE VIII ABOUT HERE >

For renegotiation frictions, the proxy *shareholders* increases from quantile 1 to quantile 5 for distressed firm, and the difference between quantile 1 and quantile 5 is significant for raw and risk-adjusted returns. The difference of 56 basis points is also economically important. By contrast, the difference between quantile 1 and quantile 5 is less pronounced for healthy firms. This supports the prediction from the model that renegotiation frictions have a positive effect on stock returns, and that this effect is more important for distressed firms.

The results are not as strong for secured and convertible debt. There is, however, a tendency that firms perform better in quantile 5 than in quantile 1 for distressed firms. I cannot document this effect for healthy firms. In this sense, the results with the *distance to default* as a proxy for distress generally support the results from the previous subsections.

The second additional measure for distress is based on Zmijewski's (1984) probit model for predicting bankruptcy.[17] As for the *distance to default*, I make two groups of firms based on the below- and above-median probability of default. Panel B of Table VIII presents the results. For distressed firms, the results are very similar to the results for the *distance to default*, but somewhat stronger for convertible debt. For healthy firms, the effect of secured and convertible debt on stock returns is inconclusive. Taken together, these results suggest that the main findings of in this paper are not sensitive to the measure of financial distress.

In this section I address several concerns that might arise due to endogeneity and to the measurement of financial distress. The results support the model's predictions and the conclusions from the Fama and MacBeth (1973) and portfolio analysis.

6 Conclusions

This paper analyzes within a contingent claims framework whether debt structure and the strategic interaction between shareholders and bondholders in default affects expected stock returns. In this framework, shareholders can act strategically to induce default and recover a substantial fraction of firm value, even though they are residual claimants. The implications of the model regarding bargaining power of shareholders, liquidation costs, and expected stock returns are consistent with earlier models and with the available empirical evidence. In

[17] The probability of default based on the Zmijewski model is
$N\left(-4.3 - 4.5\left(\frac{NetIncome}{TotalAssets}\right) + 5.7\left(\frac{TotalLiabilities}{TotalAssets}\right) - 0.004\left(\frac{CurrentAssets}{CurrentLiabilities}\right)\right)$, where N is the standard cumulative normal distribution function.

addition, the model generates new predictions regarding the relation between renegotiation frictions, secured and convertible debt, and stock returns. In particular, the model predicts that firms have higher expected stock returns if renegotiation is likely to fail, if firms have a greater fraction of their debt that is secured, or if firms have a large fraction of convertible debt in their capital structure.

Using a large sample of publicly traded US firms between 1985 and 2005, I find that stock returns of distressed firms are increasing with renegotiation frictions, and with the fraction of secured or convertible debt. These results are consistent with the model's predictions.

The main results are stable to robustness checks. Specifically, I correct for a possible endogeneity bias, and I use an alternative measure of financial distress. The main conclusions remain unaltered. Overall, these new results highlight that firm characteristics such as the type of debt and frictions that influence strategic actions are an important component of stock returns.

7 Appendix 1

7.1 Straight debt

The value of equity $E(X)$ satisfies the following ordinary differential equation (ODE)

$$\frac{1}{2}\sigma^2 X^2 E_{XX} + \mu X E_X - rE + (1-\tau)(X-c) = 0, \tag{A.1}$$

where E_X and E_{XX} are the first and second derivatives of the equity value with respect to the state variable X. The ODE is solved subject to the value-matching, smooth-pasting, and no-bubbles condition:

$$\lim_{X \downarrow X_B} E(X) = (1-q)\eta\alpha \frac{X_B}{r-\mu}(1-\tau), \tag{A.2}$$

$$\lim_{X \downarrow X_B} E_X(X) = (1-q)\eta\alpha \frac{1}{r-\mu}(1-\tau), \tag{A.3}$$

$$\lim_{X \uparrow \infty} E(X)/X \leq \infty. \tag{A.4}$$

The general solution to A.1 is

$$E(X) = AX^{\lambda_1} + BX^{\lambda_2} + (1-\tau)\left(\frac{X}{r-\mu} - \frac{c}{r}\right), \tag{A.5}$$

where λ_1 and λ_2 are given by

$$\lambda_1 = \left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right) + \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}} > 0, \tag{A.6}$$

$$\lambda_2 = \left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right) - \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2r}{\sigma^2}} < 0. \tag{A.7}$$

Condition A.4 implies that $A = 0$. Using A.2 and A.3 in conjunction with A.5, algebraic derivations yield the desired results. The total value of the firm is then the sum of the values of equity and debt which is equal to the present value of cash flows minus expected liquidation costs plus expected tax shields. The value of debt can then be deduced from the value of the firm and the value of equity.

To get the expression for the equity beta, apply Ito's lemma to the value of equity. This yields

$$\beta_E = \frac{\partial E}{\partial X}\frac{X}{E}\beta_X, \tag{A.8}$$

where β_X is the beta of the firm's cash flow. Normalizing β_X to 1, and taking the derivative of $E(X)$ with respect to X, multiplying by X/E and replacing for X_B yields the expression for the equity beta.

7.2 Secured Debt

The value of equity satisfies the same ODE as in the straight debt case (A.1). The value-matching, smooth-pasting, and no-bubbles conditions are given by:

$$\lim_{X \downarrow X_B} E^S(X) = (1-q)\eta\alpha\,(1-\pi)\,\frac{X_B}{r-\mu}\,(1-\tau)\,, \tag{A.9}$$

$$\lim_{X \downarrow X_B} E^S_X(X) = (1-q)\eta\alpha\,(1-\pi)\,\frac{1}{r-\mu}\,(1-\tau)\,. \tag{A.10}$$

$$\lim_{X \uparrow \infty} E^S(X)/X \leq \infty. \tag{A.11}$$

Using the same form of general solution A.5 in conjunction with A.9 and A.10, algebraic derivations yield the desired results. Applying Itô's lemma to the value of equity, and using the same steps as in the straight debt case, one can derive the equity beta.

7.3 Convertible Debt

The value of equity satisfies the same differential equation as in the straight and secured debt case (A.1). The lower and upper boundary conditions to price equity in the presence of convertible debt are as follows:

$$\lim_{X \downarrow X_B} E(X) = (1-q)\eta\alpha\frac{X_B}{r-\mu}\,(1-\tau)\,, \tag{A.12}$$

$$\lim_{X \downarrow X_B} E_X(X) = (1-q)\eta\alpha\frac{1}{r-\mu}\,(1-\tau)\,, \tag{A.13}$$

$$\lim_{X \uparrow X_C} E(V) = (1-\gamma)\,(\upsilon(X_C) - D\,(X_C))\,, \tag{A.14}$$

$$\lim_{X \uparrow X_C} E_X(X) = (1-\gamma)\,\frac{\partial\,(\upsilon(X_C) - D\,(X_C))}{\partial X_C}. \tag{A.15}$$

Using the same form of general solution as in the straight and secured debt case, algebraic manipulation yields the value of equity.

To obtain the value of convertible debt, define $\varphi = cc/(cs+cc)$. If there is renegotiation in default, convertible debtholders bargain with straight bondholders on their side as one party against shareholders and recover $\varphi\,(1-\eta\alpha)\,[X_B/(r-\mu)]\,(1-\tau)$ of firm value. If there is liquidation, convertible bondholders share the unlevered firm value after liquidation costs and get $\varphi\,(1-\alpha)\,[X_B/(r-\mu)]\,(1-\tau)$. Upon conversion, convertible bondholders obtain a fraction γ of the value of equity after conversion, or $\gamma\,(\upsilon(X_C) - D\,(X_C))$. The boundary conditions for convertible bondholders to price their claim are:

$$\lim_{X \downarrow X_B} D^C(X) = \left[\varphi\left(1-q\right)\left(1-\eta\alpha\right) + \varphi q\left(1-\alpha\right)\right] \frac{X_B}{r-\mu}\left(1-\tau\right), \tag{A.16}$$

$$\lim_{X \downarrow X_B} D_X^C(X) = \left[\varphi\left(1-q\right)\left(1-\eta\alpha\right) + \varphi q\left(1-\alpha\right)\right] \frac{1}{r-\mu}\left(1-\tau\right), \tag{A.17}$$

$$\lim_{X \uparrow X_C} D^C(X) = \gamma\left(\upsilon(X_C) - D\left(X_C\right)\right), \tag{A.18}$$

$$\lim_{X \uparrow X_C} D_X^C(X) = \gamma \frac{\partial\left(\upsilon(X_C) - D\left(X_C\right)\right)}{\partial X_C}. \tag{A.19}$$

Using the same techniques as for the value of equity yields the value of convertible debt.

To derive the expression for the equity beta, apply Itô's lemma to the value of equity, and the result follows.

8 Appendix 2

Taking the derivative of the equity beta with respect to q and X, we get the following expression:

$$\frac{\partial^2 \beta}{\partial q \partial X} = \frac{\begin{array}{c} r\alpha\eta\left(\lambda-1\right)^2\left(\frac{rX(1+(q-1)\alpha\eta)(\lambda-1)}{c\lambda(r-\mu)}\right)^{\lambda-1} \\ \left[\begin{array}{c} \left(\lambda-1\right)\left(-r^2X^2\left(\lambda-1\right)^2+crX\left(-1+2\lambda\left(\lambda-1\right)\right)\left(r-\mu\right)-c^2\lambda^2\left(r-\mu\right)^2\right) \\ +c\left(\frac{rX(1+(q-1)\alpha\eta)(\lambda-1)}{c\lambda(r-\mu)}\right)^{\lambda}\left(r-\mu\right)\left(-r\left(X\left(\lambda-1\right)^2-c\lambda^2\right)-c\lambda^2\mu\right) \end{array}\right] \end{array}}{\left[rX\left(\lambda-1\right)-c\left(\lambda-1+\left(\frac{rX(1+(q-1)\alpha\eta)(\lambda-1)}{c\lambda(r-\mu)}\right)^{\lambda}\right)\left(r-\mu\right)\right]^3} < 0$$

The first line in the numerator is positive, and so is the term in square brackets in the numerator. Since the denominator is negative, the whole term is negative.

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Figure I. Convertible Debt - Constant Leverage

This figure shows the value of equity and the equity beta for varying fractions of convertible to total debt φ, and for a cash flow of 10. The parameter values used to produce the figures are: risk free rate r is 6%, μ is 2%, the coupon cs is 5, cash flow volatility is 30%, γ is 0.5, renegotiation frictions q is 0.5, bargaining power η is 0.5, and liquidation costs α are 5%.

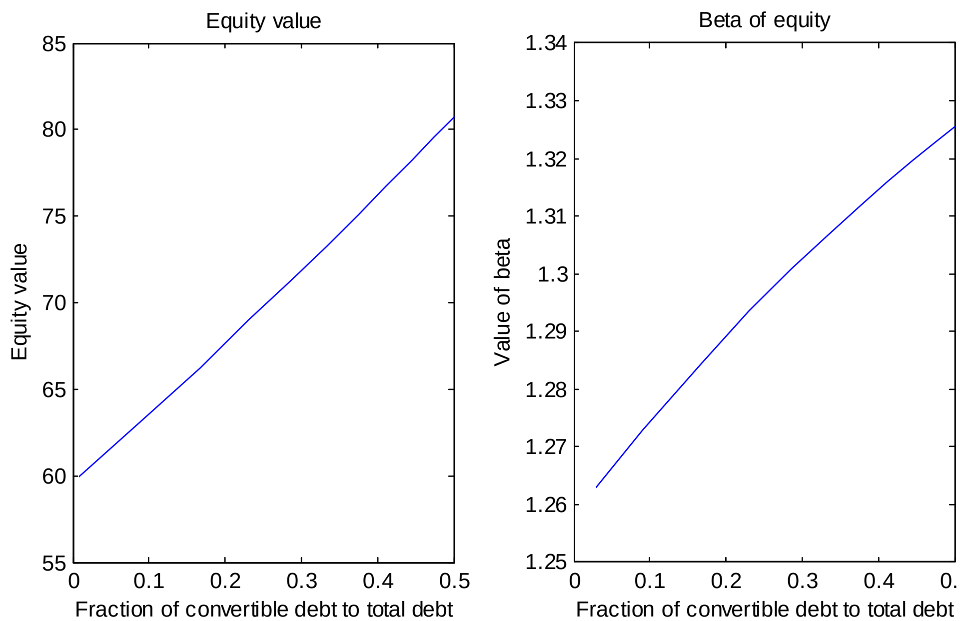

Table I. Definition of Variables

This table describes the variables used in the empirical analysis. CRSP is the University of Chicago's Center for Research in Security Prices database. TF Ownership is the Thomson Financial Ownership Data of quarterly institutional stock holdings taken from SEC forms 13F. Compustat is Standard & Poor's Compustat database. Finally, Execucomp is Standard & Poor's Execucomp Database on executive compensation.

Variables	Proxy	Description	Source
Liquidation cost	*intangibles*	1 - (cash + 0.715*receivables + 0.547*inventories + 0.535*ppenet) / Total assets	Compustat
Frictions	*shareholders*	Log(Number of institutional shareholders) / log(Market equity)	TF Owner & Compustat
Bargaining power	*ceoshareholding*	Percentage of total equity owned by the CEO	Execucomp
Bargaining power	*rd*	Research and development expenses divided by total assets	Compustat
Secured debt	*secured*	Secured debt divided by total debt	Compustat
Convertible debt	*convertible*	Convertible debt divided by total debt	Compustat
Convertible debt	*dconv*	Dummy equal to one if the firm has convertible debt, zero otherwise	Compustat
Control	*size*	Log(Market value of equity)	CRSP
Control	*book-to-market*	Log((Total assets - total debt) / Market value of equity)	Compustat
Control	*leverage*	(Total assets - book equity) / (Market equity + total assets - book equity)	Compustat
Control	*momentum*	Average stock return over the past 12 month, skipping the most recent month	CRSP
Distress	*Z-score*	1.2*WCap./TA + 1.4*RetEarn/TA + 3.3*EBIT/TA + 0.6*ME/ TL + Sales/TA	CRSP & Compustat
Distress	*distance to default*	Distance to default from structural model	CRSP & Compustat
Distress	*edf*	Expected default frequency, N(-*distance to default*)	CRSP & Compustat
Distress	*Prob. of default*	N(-4.3 - 4.5*NetIncome/TA + 5.7*Total liab/TA - 0.004*CurrAssets/CurrLiab)	Compustat

Table II. Descriptive Statistics

This table reports summary statistics for returns and the independent variables. The sample goes from 1985 to 2005, except for the variables that are taken from Execucomp, where the sample runs from 1994 to 2005. *return* is the monthly stock return, *intangibles* is one minus (cash + 0.715*receivables + 0.547*inventories + 0.535*ppenet) / Total assets, *shareholders* is the normalized number of institutional shareholders, *ceoshareholding* is the percentage of total equity held by the CEO, *secured* is the proportion of secured to total debt, *convertible* is the proportion of convertible to total debt, *rd* is research and development expenses to total assets, *size* is the log market value of equity, *book-to-market* is the book-to-market ratio, *leverage* is debt over market value of the firm, and *momentum* is the average stock return over the past 12 month.

	Full Sample					
	Mean	25%	Median	75%	Std. Dev.	N
return	1.052	-7.784	0	8.302	16.744	567146
intangibles	46.399	39.519	45.996	53.613	13.946	567146
Nb. Of shareholders	58.487	8	22	67	99.412	567146
shareholders	0.631	0.581	0.665	0.730	0.206	567146
ceoshareholding	12.363	1.155	3.864	13.792	19.651	81373
secured	35.734	0.013	21.865	69.565	36.651	567146
convertible	6.787	0	0	0	20.684	567140
rd	0.017	0	0	0.002	0.088	333905
size	4.755	3.286	4.577	6.116	1.997	567146
book-to-market	1.142	0.471	0.844	1.426	1.065	567146
leverage	24.682	5.250	18.663	38.771	22.476	567146
momentum	1.257	-1.547	1.062	3.693	5.055	567146

Table III. Descriptive Statistics for Secured and Convertible Debt

This table reports summary statistics for firms with and without secured and convertible debt. The sample goes from 1985 to 2005. *cash* is cash and cash equivalents, *total assets* is total book assets, *total debt* is total debt outstanding, *leverage* is total debt over the market value of the firm, *assetvol* is the volatility of assets, *edf* is the expected default frequency, and *book-to-market* is the book-to-market ratio.

Panel A: Firms with no Secured Debt						
	Mean	25%	Median	75%	Std. Dev.	N
cash	100.308	2.694	14.421	65.948	255.826	141383
total assets	1360.056	37.618	190.239	915.377	3339.605	141383
total debt	335.649	1.883	23.055	198.912	924.563	141383
leverage	17.701	2.704	12.034	26.867	18.391	141383
assetvol	0.612	0.331	0.491	0.767	0.411	136795
edf	0.118	0	0	0.035	0.263	136795
book-to-market	0.986	0.422	0.752	1.235	0.906	141383

Panel B: Firms with Secured Debt						
cash	51.073	1.441	6.582	29.174	165.304	425763
total assets	728.265	30.270	96.647	360.078	2333.574	425763
total debt	223.029	3.515	18.071	100.446	734.668	425763
leverage	27.000	6.600	21.523	42.570	23.218	425763
assetvol	0.677	0.404	0.587	0.842	0.395	421113
edf	0.207	0	0.002	0.311	0.334	421113
book-to-market	1.194	0.490	0.877	1.493	1.108	425763

Panel C: Firms with no Convertible Debt						
cash	54.435	1.512	7.006	31.188	175.169	480158
total assets	814.641	29.267	98.017	392.901	2535.356	480158
total debt	224.752	2.440	14.133	90.697	752.529	480158
leverage	22.868	4.084	16.228	36.063	22.032	480158
assetvol	0.663	0.383	0.569	0.831	0.399	471632
edf	0.173	0	0	0.178	0.311	471632
book-to-market	1.135	0.468	0.836	1.415	1.065	480158

Panel D: Firms with Convertible Debt						
cash	112.533	2.866	16.395	78.937	266.174	86982
total assets	1278.377	52.788	229.688	890.942	3099.114	86982
total debt	396.584	17.477	80.616	272.513	946.445	86982
leverage	34.696	16.554	31.393	50.655	22.272	86982
assetvol	0.651	0.381	0.545	0.796	0.406	86274
edf	0.255	0	0.013	0.492	0.361	86274
book-to-market	1.179	0.492	0.888	1.489	1.068	86982

Table IV. Fama / MacBeth Analysis

This table presents Fama/MacBeth regressions for various specifications. The dependent variable is the monthly stock return. *shareholders* is the normalized number of institutional shareholders, *secured* is the proportion of secured to total debt, *convertible* is the proportion of convertible to total debt, and *dconv* is a dummy equal to one if the firm has convertible debt outstanding, and zero otherwise. The control variables are defined according to Table I. Each month, a cross-sectional regression is estimated. The time-series mean of the monthly regression coefficients and absolute values of t-statistics are reported in parentheses. The numbers in brackets are the changes in average monthly returns when the independent variable increases by one standard deviation. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance level, respectively.

Panel A: Full Sample						
	(1)	(2)	(3)	(4)	(5)	(6)
shareholders	0.615**		0.608**		0.620**	0.608**
	(2.31)		(2.29)		(2.38)	(2.34)
	[0.13]		[0.13]		[0.13]	[0.13]
secured		0.002***	0.002***			0.002**
		(2.71)	(2.67)			(2.50)
		[0.07]	[0.07]			[0.07]
convertible				0.005**	0.005**	0.005**
				(2.30)	(2.13)	(2.40)
				[0.11]	[0.11]	[0.11]
dconv				-0.465***	-0.446***	-0.454***
				(4.37)	(4.19)	(4.26)
size	0.089	0.113*	0.100	0.109*	0.096	0.107*
	(1.46)	(1.82)	(1.62)	(1.78)	(1.57)	(1.72)
book-to-market	0.658***	0.710***	0.665***	0.695***	0.648***	0.657***
	(7.10)	(8.05)	(7.22)	(8.03)	(7.22)	(7.40)
momentum	0.018	0.018	0.017	0.018	0.017	0.016
	(0.93)	(0.95)	(0.88)	(0.95)	(0.89)	(0.85)
leverage	-0.013***	-0.013***	-0.013***	-0.011***	-0.011***	-0.012***
	(5.43)	(5.44)	(5.47)	(4.63)	(4.65)	(4.70)
constant	0.667	0.892*	0.553	0.976*	0.631	0.522
	(1.46)	(1.75)	(1.20)	(1.92)	(1.37)	(1.13)
N	567146	567146	567146	567140	567140	567140
Avg. R-squared	0.031	0.030	0.032	0.031	0.033	0.034
No. of months	252	252	252	252	252	252

Table IV. continued

Panel B: Distressed Firms - Low Z-score						
	(1)	(2)	(3)	(4)	(5)	(6)
shareholders	0.628**		0.649**		0.612**	0.621**
	(2.05)		(2.14)		(2.09)	(2.12)
	[0.15]		[0.16]		[0.15]	[0.15]
secured		0.003***	0.003***			0.004***
		(2.61)	(2.69)			(2.92)
		[0.12]	[0.12]			[0.15]
convertible				0.007*	0.006	0.007**
				(1.84)	(1.64)	(2.04)
				[0.16]	[0.14]	[0.16]
dconv				-0.4523***	-0.423***	-0.434***
				(3.11)	(2.91)	(2.98)
size	0.065	0.085	0.082	0.075	0.071	0.089
	(0.96)	(1.22)	(1.18)	(1.10)	(1.04)	(1.29)
book-to-market	0.489***	0.540***	0.494***	0.524***	0.479***	0.492***
	(5.33)	(6.10)	(5.39)	(6.05)	(5.39)	(5.53)
momentum	0.031	0.031	0.030	0.032	0.031	0.030
	(1.60)	(1.61)	(1.53)	(1.64)	(1.58)	(1.52)
leverage	-0.008**	-0.009**	-0.009**	-0.007*	-0.007*	-0.008**
	(2.24)	(2.32)	(2.37)	(1.87)	(1.94)	(2.07)
constant	0.503	0.734	0.316	0.873	0.492	0.281
	(0.50)	(1.26)	(0.57)	(1.58)	(0.92)	(0.051)
N	184721	184721	184721	184721	184721	184721
Avg. R-squared	0.033	0.031	0.034	0.033	0.037	0.039
No. of months	252	252	252	252	252	252

Table IV. continued

Panel C: Healthy Firms - High Z-score						
	(1)	(2)	(3)	(4)	(5)	(6)
shareholders	0.740*		0.706*		0.700*	0.662*
	(1.87)		(1.79)		(1.76)	(1.68)
	[0.14]		[0.13]		[0.13]	[0.12]
secured		0.001	0.001			0.001
		(1.16)	(1.07)			(1.02)
		[0.05]	[0.05]			[0.04]
convertible				0.010**	0.010**	0.011**
				(2.07)	(2.08)	(2.18)
				[0.16]	[0.16]	[0.18]
dconv				-0.979***	-0.969***	-0.991***
				(2.78)	(2.78)	(2.85)
size	0.135**	0.163**	0.142**	0.167**	0.146**	0.153**
	(1.96)	(2.34)	(2.03)	(2.41)	(2.10)	(2.18)
book-to-market	0.769***	0.832***	0.775***	0.824***	0.768***	0.774***
	(6.67)	(7.60)	(6.76)	(7.56)	(6.70)	(6.81)
momentum	-0.001	-0.000	-0.001	-0.001	-0.002	-0.002
	(0.05)	(0.02)	(0.06)	(0.06)	(0.11)	(0.12)
leverage	-0.006	-0.010	-0.006	-0.006	-0.002	-0.003
	(0.35)	(0.59)	(0.39)	(0.33)	(0.12)	(0.16)
constant	0.462	0.787	0.411	0.814	0.436	0.388
	(0.87)	(1.38)	(0.77)	(1.42)	(0.82)	(0.72)
N	184713	184713	184713	184707	184707	184707
Avg. R-squared	0.04	0.038	0.042	0.039	0.043	0.045
No. of months	252	252	252	252	252	252

Table V. Portfolio Returns

In June of each year, stocks are grouped into quantiles based on renegotiation frictions, secured debt, and convertible debt. The grouping for secured and convertible debt is done conditional that a firm has secured or convertible debt outstanding. The average monthly returns (in percent) of the quantile portfolios are reported, as well as the difference between quantile 1 and quantile 5 and the corresponding t-statistic. Firm-level raw returns are unadjusted returns averaged across firms within the same quantile. Firm-level adjusted returns are calculated by subtracting the return on a characteristic-based benchmark from each firm's return, then averaging within the same quantile. The characteristic-based benchmarks are constructed following Daniel et al. (1997) to account for the premia associated with size, book-to-market, and momentum. *shareholders* is the normalized number of institutional shareholders, *secured* is the proportion of secured to total debt, and *convertible* is the proportion of convertible to total debt. N is the average number of observations per quantile. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance level (one-sided), respectively.

Firm level returns								
Panel A: Low Z-score - Distressed Frims								
	Quantile							
	1	2	3	4	5	1 - 5	t-statistic	N
shareholders								
raw returns	0.767	1.058	0.946	1.046	1.000	-0.234*	-1.43	28007
risk-adj. returns	-0.857	-0.398	-0.490	-0.425	-0.594	-0.263*	-1.62	28007
secured								
raw returns	0.861	0.912	0.962	0.892	1.158	-0.296**	-1.77	21116
risk-adj. returns	-0.589	-0.585	-0.575	-0.683	-0.448	-0.141	-0.85	21116
convertible								
raw returns	0.061	0.785	0.796	0.578	0.870	-0.809**	-1.96	4017
risk-adj. returns	-1.418	-0.674	-0.649	-0.936	-0.396	-1.022***	-2.50	4017
Panel B: High Z-score: Healthy Firms								
shareholders								
raw returns	0.714	1.051	1.161	1.215	1.303	-0.589***	-3.56	27836
risk-adj. returns	-0.463	-0.097	0.030	0.081	0.096	-0.559***	-3.41	27836
secured								
raw returns	0.998	1.245	1.165	1.244	1.060	-0.062	-0.41	22542
risk-adj. returns	-0.161	0.072	0.028	0.057	-0.124	-0.037	-0.24	22542
convertible								
raw returns	1.054	0.989	0.946	1.101	0.752	0.302	0.91	4532
risk-adj. returns	-0.229	-0.317	-0.295	-0.072	-0.353	0.124	0.38	4532

Table VI. Portfolio Returns

In June of each year, stocks are grouped into terciles based on renegotiation frictions, secured debt, and convertible debt. The average monthly returns (in percent) of the tercile portfolios are reported, as well as the difference between tercile 1 and tercile 3 and the corresponding t-statistic. Firm-level raw returns are unadjusted returns averaged across firms within the same tercile. Firm-level adjusted returns are calculated by subtracting the return on a characteristic-based benchmark from each firm's return, then averaging within the same tercile. The characteristic-based benchmarks are constructed following Daniel et al. (1997) to account for the premia associated with size, book-to-market, and momentum. *intangibles* is one minus tangible assets over total assets, *ceoshareholding* is the percentage of total equity owned by the CEO, and *rd* is research and development expenses to total assets. N is the average number of observations in a quantile. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance level (one-sided), respectively.

	Firm level returns											
	Z-score											
	Distressed Firms						Healthy Firms					
	Tercile						Tercile					
	1	2	3	1 - 3	t-statistic	N	1	2	3	1 - 3	t-statistic	N
intangibles												
raw returns	1.105	0.969	0.828	0.277***	2.42	46679	1.171	1.197	0.923	0.248**	2.12	46393
risk-adj. returns	-0.436	-0.567	-0.634	0.198**	1.75	46679	0.085	0.001	-0.265	0.350***	3.02	46393
rd												
raw returns	0.895	1.052	1.097	-0.202**	-2.04	46679	0.808	1.361	1.204	-0.396***	-3.41	46392
risk-adj. returns	-0.645	-0.349	-0.380	-0.265***	-2.70	46679	-0.403	0.185	0.125	-0.528***	-4.58	46392
ceoshareholding												
raw returns	1.697	0.502	0.992	0.704**	1.50	1833	1.755	1.460	1.675	0.080	0.21	2719
risk-adj. returns	0.359	-0.829	-0.426	0.785**	1.68	1833	0.644	0.312	0.586	0.057	0.15	2719

Table VII. Robustness Check - Secured and Convertible Debt

This table presents results from a 2-step efficient GMM estimation using instruments for secured and convertible debt. The dependent variable is the monthly stock return. *shareholders* is the normalized number of institutional shareholders, *secured* is the proportion of secured to total debt, and *convertible* is the proportion of convertible to total debt. The control variables are defined according to Table I. All four specifications include monthly dummies. The instruments for secured and convertible debt are income tax over pretax income, capitalized lease obligations to total assets, and current debt to total debt. The Hansen J-Statistic of overidentifying restrictions and its p-values are presented at the bottom of the table. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance level, respectively.

Panel A: Secured Debt				
	(1)	(2)	(3)	(4)
Z-score	Distressed Firms		Healthy Firms	
secured	0.009***	0.009***	0.000	-0.000
	(2.66)	(2.59)	(0.07)	(0.03)
shareholders		0.649***		0.680**
		(3.24)		(2.47)
size	0.107***	0.093***	0.174***	0.149***
	(3.74)	(3.24)	(7.43)	(6.05)
book-to-market	0.617***	0.578***	0.906***	0.852***
	(9.34)	(8.64)	(15.39)	(13.84)
momentum	0.023**	0.022**	-0.004	-0.005
	(2.30)	(2.23)	(0.41)	(0.45)
leverage	-0.011***	-0.011***	-0.017*	-0.014
	(3.82)	(3.88)	(1.69)	(1.40)
constant	11.190***	10.993***	15.302***	15.041***
	(13.24)	(12.95)	(22.06)	(21.37)
monthly dummies	yes	yes	yes	yes
N	179746	179746	183329	183329
R-squared	0.103	0.103	0.154	0.154
Hansen J-Statistic	1.594	1.531	5.685	5.583
p-value (J-Stat)	0.451	0.465	0.058	0.061

Table VII. continued

Panel B: Convertible Debt				
	(1)	(2)	(3)	(4)
Z-score	Distressed Firms		Healthy Firms	
convertible	0.043***	0.042***	-0.041	-0.043
	(2.70)	(2.60)	(1.09)	(1.13)
dconv	-1.793**	-1.775***	2.213	2.331
	(2.95)	(2.89)	(0.90)	(0.95)
shareholders		0.393*		0.723***
		(1.65)		(2.60)
size	0.097***	0.089***	0.171***	0.146***
	(3.81)	(3.30)	(7.22)	(5.75)
book-to-market	0.658***	0.632***	0.871***	0.814***
	(9.10)	(8.30)	(13.92)	(12.27)
momentum	0.022**	0.022**	-0.004	-0.005
	(2.22)	(2.17)	(0.42)	(0.46)
leverage	-0.005	-0.005	-0.014	-0.011
	(1.50)	(1.55)	(1.40)	(1.10)
constant	11.601***	11.479***	15.270***	14.981***
	(14.11)	(13.93)	(22.27)	(21.47)
monthly dummies	yes	yes	yes	yes
N	179746	179746	183323	183323
R-squared	0.102	0.102	0.154	0.154
Hansen J-Statistic	2.547	2.693	3.228	3.014
p-value (J-Stat)	0.280	0.260	0.199	0.222

Table VIII. Robustness Check - Alternative Measures of Distress

In June of each year, stocks are grouped into quantiles based on renegotiation frictions, secured debt, and convertible debt. The grouping for secured and convertible debt is done conditional on the respective debt outstanding. The average monthly returns (in percent) of the quantile portfolios are reported, as well as the difference between quantile 1 and quantile 3 and the corresponding t-statistic. Firm-level raw returns are unadjusted returns averaged across firms within the same quantile. Firm-level adjusted returns are calculated by subtracting the return on a characteristic-based benchmark from each firm's return, then averaging within the same quantile. The characteristic-based benchmarks are constructed following Daniel et al. (1997) to account for the premia associated with size, book-to-market, and momentum. *shareholders* is the normalized number of institutional shareholders, *secured* is the proportion of secured to total debt, and *convertible* is the proportion of convertible to total debt. N is the average number of observations per quantile. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance level (one-sided), respectively.

Firm level returns								
Panel A: Distance-to-Default								
	Quantile							
	1	2	3	4	5	1 - 5	t-statistic	N
Distressed Firms - Low Distance to Default								
shareholders								
raw returns	0.465	0.760	0.856	0.805	0.982	-0.516***	-3.69	42311
risk-adj. returns	-1.171	-0.713	-0.574	-0.644	-0.606	-0.566***	-4.09	42311
secured								
raw returns	0.703	0.623	0.816	0.779	0.937	-0.233*	-1.62	32369
risk-adj. returns	-0.786	-0.890	-0.719	-0.796	-0.671	-0.114	-0.80	32369
convertible								
raw returns	0.527	0.652	0.463	0.400	0.661	-0.135	-0.41	6434
risk-adj. returns	-1.0008	-0.857	-1.016	-1.096	-0.680	-0.328	-1.00	6434
Healthy Firms - High Distance to Default								
shareholders								
raw returns	1.133	1.392	1.378	1.440	1.338	-0.206**	-1.96	45279
risk-adj. returns	0.004	0.186	0.157	0.196	0.063	-0.059	-0.56	45279
secured								
raw returns	1.329	1.400	1.343	1.337	1.321	0.008	0.08	35397
risk-adj. returns	0.072	0.153	0.146	0.149	0.096	-0.024	-0.24	35397
convertible								
raw returns	1.268	1.438	1.025	1.250	0.831	0.437**	1.93	7018
risk-adj. returns	-0.022	0.120	-0.238	0.063	-0.266	0.24	1.08	7018

Table VIII. continued

Panel B: Probability of Default - Zmijewski Score								
	Quantile							
	1	2	3	4	5	1 - 5	t-statistic	N
Distressed Firms - High Probability of default								
shareholders								
raw returns	0.493	0.873	0.965	1.003	0.986	-0.493***	-3.61	40748
risk-adj. returns	-0.945	-0.479	-0.376	-0.378	-0.516	-0.429***	-3.17	40748
secured								
raw returns	0.824	0.790	0.779	0.717	1.039	-0.215*	-1.58	31253
risk-adj. returns	-0.564	-0.628	-0.620	-0.691	-0.466	-0.098	-0.73	31253
convertible								
raw returns	0.414	0.690	0.635	0.622	0.826	-0.411	-1.27	6193
risk-adj. returns	-1.033	-0.733	-0.758	-0.774	-0.271	-0.761***	-2.36	6193
Healthy Firms - Low Probability of Default								
shareholders								
raw returns	0.967	1.321	1.255	1.346	1.332	-0.365***	-3.12	42618
risk-adj. returns	-0.441	0.038	-0.015	0.062	-0.047	-0.393***	-3.38	42618
secured								
raw returns	1.300	1.285	1.335	1.405	1.163	0.137	1.22	33487
risk-adj. returns	-0.021	-0.043	-0.006	0.058	-0.186	0.164	1.47	33487
convertible								
raw returns	1.382	1.214	0.886	0.987	0.821	0.561**	2.21	6768
risk-adj. returns	-0.001	-0.208	-0.475	-0.316	-0.431	0.430**	1.70	6768