Board Compensation Practices and Agency Costs of Debt

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Abstract

Extant theory and empirical evidence indicate that equity-based compensation (EBC) can align the interests of *managers* with those of shareholders, but it has a side effect of aggravating bondholder-shareholder conflicts by increasing managers' risk-shifting incentives. Recent evidence confirms that extending EBC to *outside directors* also is effective in aligning their interests with those of shareholders, but its adverse effects on the debt-related agency problems is unknown. In this paper, we examine how the EBC for outside directors affects corporate bond yields in the secondary market. Our results show that the greater the ratio of outside directors' stock and option compensation to total compensation, the lower the average yield spreads on the firms' outstanding bonds, with stock compensation having a larger impact than option compensation. Further, director EBC is more effective in lowering yield spreads for lower rated firms and for firms with high R&D expenditures.

The literature on agency problems, pioneered by Jensen and Meckling (1976), points out that shareholders of leveraged firms have incentives to expropriate wealth from bondholders through investing in riskier projects. Shareholders will reap the benefits if riskier projects turn out to be successful, but debtholders will bear the costs if the projects flop. Anticipating these incentives, bondholders require higher returns on their capital resulting in higher cost of debt. Further, shareholder-manager conflicts in the form of managerial work-shirking, perquisite consumption and overinvestment emerge when managers own but a fraction of the firm. A fundamental solution to these conflicts (other than EBC for managers) is to create a board of directors to monitor managers. However, like managers even directors may lack incentives to act in the best interest of shareholders. To reduce these director – shareholder conflicts, a growing number of firms have awarded EBC to outside directors over the last decade[1]. Recent evidence suggests that EBC helps align incentives of outside directors and shareholders (Fich and Shivdasani, 2005; Bryan et al., 2000).

John and John (1993) observe that in designing a compensation structure a company should consider not only the agency relationship between shareholders and managers but also the

[1] For example, Perry (1999) finds the percentage of S&P 500, Midcap and Smallcap index firms that use EBC for outside directors increased from 48% to 70% from 1992 to 1995.

potential conflicts of interest in other contracting relationships, such as bondholder-shareholder conflicts. A compensation structure which is designed to minimize agency costs arising from shareholder-manager conflicts might aggravate the shareholder-bondholder conflicts. EBC in the form of stock and stock options might help align manager-shareholder incentives, but it might increase risk-shifting incentives of managers. On the other hand, EBC for directors might benefit bondholders through improved monitoring by directors.

In this paper, we empirically analyze the effect of director EBC on bondholder-stockholder conflicts as proxied by secondary market yield spreads on firms' debt. Such an analysis is important for two reasons. First, as mentioned before, there has been a substantial increase in director equity-based compensation (see, e.g., Perry (1999)) in US corporations. Further, there has also been a significant increase in regulatory scrutiny over corporate compensation levels and schemes for directors and managers in recent years. Second, debt constitutes a major part of firms' capital structure in the US, which makes it important to understand the factors that affect the cost of debt to a firm[2]. However, there is little research on how bondholders view the incentive effects of EBC for outside directors.

In this empirical paper, we examine two competing hypotheses about the impact of the structure of outside director compensation on the agency costs of debt. Specifically, our *monitoring hypothesis* posits that EBC for directors would improve board oversight and reduce corporate bond yield spreads. On the other hand, equity based compensation schemes (that increase the convexity of payoffs to directors) could tempt outside directors to overlook managerial opportunistic behavior, motivate them to favor more risky investment opportunities and financial policy alternatives put forward by managers, or even encourage them to pursue such

[2] According to Board of Governors of the Federal Reserve System Flow of Funds publications, the ratio of total debt to market value of equity for U.S. non-farm, non-financial firms for the year 2002 was 62.7%. The total amount of credit market instruments was $4,899.3 billion.

policies. Our *risk-shifting hypothesis* predicts that if EBC induces outside directors to favor more risky projects (similar to aggravating risk-shifting incentives of managers), it would increase yield spreads demanded by bondholders. In addition, Guay (1999) notes that stock options provide stronger risk-taking incentives than do stock holdings. This motivates our *form of compensation* hypothesis which claims that bondholders would demand higher yield spreads from firms that offer option compensation rather than stock compensation to outside directors. Further, the agency literature shows that the risk-shifting incentives of managers and owners are aggravated when a high-debt firm is under financial distress. This leads us to predict that investors in poorly-rated debt view EBC for outside directors, especially stock grants, more favorably than their counterparts holding high-quality debt. We term this prediction the *default risk mitigation hypothesis.* Finally, managerial risk-shifting is a greater concern for creditors when firms have riskier set of investment opportunities. Board oversight over managers is particularly beneficial to stockholders and bondholders of firms with investment opportunities. Therefore, we expect bondholders to put more value on the monitoring benefits of EBC for external directors, particularly stock compensation, when firms spend more on R&D. We call this prediction the *investment monitoring hypothesis*.

Our main findings are as follows. First, the percentage of stock and option compensation to total compensation of outside directors is negatively associated with seasoned bond yield spreads after controlling for standard spread determinants. This suggests that the monitoring incentives provided by EBC for outside directors exceed the risk-shifting incentives provided by them. Second, we find that stock compensation for outside directors is more effective in lowering yield spreads than option compensation. This result suggests that monitoring incentives provided by stock compensation are higher than those provided by option compensation since options are more likely to induce risk-taking incentives. We also find that director stock ownership is negatively related to yield spreads. Finally, our results show that EBC for outside directors is

more effective in lowering yield spreads when the quality (as measured by default ratings) of outstanding debt low and when the firm has higher R&D expenditures.

The results presented in this paper are economically significant. The regression estimates indicate that the mean yield spread on outstanding bonds drops by 1.64 basis points for a marginal 1% increase in the ratio of director stock and option compensation to total compensation. Alternatively, a one standard deviation change in the ratio of director stock and option compensation to total compensation (0.27, see Table 2) causes a change of 44 basis points in yield spreads on average. When we separate the stock and option compensation components, the mean yield spread decreases by 2.09 basis points for a 1% increase in the ratio of stock compensation to total compensation. In our sample, the median firm with a ratio of stock compensation to total compensation equal to 6% pays approximately 12 basis points less on its public debt than firms that do not offer stock compensation to their directors[3].

This paper contributes to the existing literature in several ways. First, this is the first study to empirically analyze how director compensation affects yield premiums of firms. Second, we are able to distinguish between monitoring and risk-shifting effects of incentive schemes and find that both effects drive the relationship between yield spreads and compensation. We are able to identify these two effects because of the differential levels risk-shifting incentives in stock based as compared to options based compensation schemes. Further, we find that monitoring effects overwhelm the risk-shifting effects for stock and options based compensation for directors. While we are able to find evidence consistent with the tradeoffs discussed in John and

[3] The economic significance of the results of this paper is comparable to similar studies. Ortiz-Molina (2006) report that borrowing costs are 8 basis points higher at a firm with top management ownership in the 75th percentile than in a firm with top management ownership in the 25th percentile. Anderson et al. (2003) find that cost of debt financing for family firms is about 32 basis points lower than it is in non-family firms. Klock et al. (2005) document that the firms with strongest antitakeover provisions pay about 34 basis points less in borrowing costs than the firms with weakest governance provisions.

John (1993), we find that the direction of the overall effect of director compensation on yield spreads is in contrast to the results obtained by John and John (1993) for managerial compensation. Finally, we show that the monitoring benefits of director stock compensation are especially important for companies that issue lower rated bonds and spend more on R&D.

Our paper is related to the literature about the effects of governance and ownership structures on bond yields. Bhojraj and Sengupta (2003) examine how institutional ownership and the presence of outside directors affect at-issue bond yields and ratings. Klock et al. (2005) investigate the relation between the cost of debt financing and takeover provisions. Ortiz-Molina (2006) shows that managerial ownership is positively related to at-issue yield spreads. In contrast to Ortiz-Molina's findings, in this paper we present strong evidence that outside director equity-based compensation is negatively related to the cost of debt. Moreover, this negative relation is stronger for stock compensation than option compensation, suggesting that monitoring benefits of stock compensation are superior to those of option compensation.

The remainder of the paper is organized as follows. The following section reviews the literature and presents our hypotheses. Section II describes the data and the research method and presents some preliminary results. Section III reports and discusses the results of multivariate analyses. Section IV presents robustness checks. Section V concludes.

I. Related Literature and Hypotheses

A. Monitoring vs. Risk Shifting

Our main objective is to investigate the effects of board compensation structures on the agency cost of debt capital. Examining the relation between corporate governance and bondholder-stockholder conflicts, several studies suggest that some governance mechanisms also

[5] Ashbaugh et al. (2004) find that the number of directors with zero shares is negatively related to bond ratings. They do not examine the impact of the level of director ownership on ratings, nor that of option compensation for outside directors.

benefit debtholders. Bhojraj and Sengupta (2003) examine how institutional ownership and the presence of outside directors affect bond yields and ratings. They find a positive (negative) relation between institutional ownership and the percentage of outside directors and bond ratings (yields). Anderson et al. (2004) examine the effect of several board characteristics on cost of debt. They find that firms with larger boards and higher percentage of independent directors have lower cost of debt. Klock et al. (2005) examine the relation between the cost of debt financing and takeover provisions. Their results suggest that antitakeover provisions are favored by bondholders, although these provisions are not beneficial to the shareholders. Investigating the effects of governance mechanisms on bond ratings, Ashbaugh et al. (2004) find that bond ratings are negatively associated with the number of blockholders that hold at least a 5% ownership in the firm and positively related to overall board independence, board stock ownership, and board expertise[5].

Analyzing the relation between EBC for outside directors and CEO turnover, Perry (1999) finds that when directors of independent boards receive EBC, the likelihood of CEO turnover following poor performance increases. His results indicate that EBC increases the monitoring incentives of outside directors. Since EBC strengthens board monitoring of corporate managers, we expect it to mitigate stockholder-bondholder conflicts and thus lower the agency cost of debt capital.

When outside directors are compensated in the form of annual director retainers and fees paid for attending regular and special board meetings, their pay is remotely tied to firm performance. In contrast, the EBC ties outside director compensation more closely to the value of equity. By increasing the pay-performance sensitivity, incentive compensation can increase firm value and thus benefit bondholders along with stockholders. Moreover, the relatively undiversified stake of directors and managers tends to induce them to pass up risky, positive NPV

projects[6]. By offering incentive compensation with convex payoffs, shareholders can reduce these risk-related agency costs and mitigate the underinvestment problem (Guay, 1999).[7] Consistent with these arguments and the studies reviewed above, we expect that both stock and option compensation schemes for outside directors would strengthen board monitoring of corporate managers, mitigates stockholder-bondholder conflicts and thus lower the agency cost of debt capital. We call this the *monitoring hypothesis*.

In the context of executive compensation policies, John and John (1993) develop a model under which the optimal compensation structure not only depends on the agency relationship between shareholders and management but also on the conflicts of interest that arise in other contracting relationships. If the company designs a compensation structure that aligns the interests of shareholders with management using stock and option compensation, such a compensation structure would increase the risk-shifting incentives of managers. They argue that a compensation structure designed to minimize agency costs of equity may give rise to high agency costs of debt. In support of these arguments, Ortiz-Molina (2006) documents a *positive* relation between managerial ownership and at-issue yield spreads. He also finds that the effect of managerial *stock option ownership* on yield spreads is larger than the effect of managerial *stock ownership* on yield spreads. Further, Coles et al. (2006) find that CEOs implement riskier policy

[6] Fich and Shivdasani (2005) find that in a typical board approximately 30 % of outside directors are CEOs of other firms with an average age of CEOs 57 years. This suggests that the portfolio holdings of outside directors are relatively ill-diversified.

[7] Guay (1999) hypothesizes that equity holders in growth firms can reduce the expected loss from valuable (+NPV) but risk-increasing projects bypassed by managers by offering them incentive schemes that have convex payoffs. Consistent with this hypothesis, he finds that the convexity in the relation between CEOs' wealth and stock price is positively related to the investment opportunity as proxied by book-to-market ratio of assets, R&D expenses divided by the market value of assets and investment expenditures plus acquisitions as a ratio of market value of assets.

choices including relatively more investment in research and development and less investment in property, plant and equipment when the sensitivity of their wealth to stock price volatility is high.

Similar to the management compensation, EBC for outside directors has the potential to increase risk-taking incentives of board members by aligning their incentives more closely with those of shareholders rather than those of bondholders. EBC could tempt outside directors to overlook managerial opportunistic behavior, motivate them to favor more risky investment and financial policy alternatives put forward by managers, or even encourage them to pursue such policies. Bryan and Klein (2004) examine how board compensation is related to firm's investment choices and future firm risk. They find that director option compensation is positively related to future change in R&D expenditures and stock volatility while stock compensation is negatively related to stock price volatility. Overall these results indicate that equity-based compensation, especially option compensation, may lead the directors to approve management's risky investment choices.

If the risk-shifting incentive effects dominate, we will observe a positive relation between EBC and debt-related agency costs. In this case, the effect of EBC for the board on the agency cost of debt will be similar to the effect of EBC for the executive (Ortiz-Molina, 2006). Such a result would indicate that the incentive compensation structure for board members is not optimal in the sense that it does not increase the total value of the firm, but only the equity value. We call the potential positive association between EBC for outside directors and the agency cost of debt the *risk-shifting hypothesis*.

B. Form of Compensation

In broad terms, compensation packages for managers and directors include cash and EBC - both stocks and stock options. From the literature on options we know that stocks are call options on the assets of a leveraged firm, and call options on those stocks contain even more degrees of leverage. Agency theory tells us that the extent of financial leverage in the corporate capital structure (i.e., the debt-equity mix) has significant managerial incentive effects.

Specifically, financial distress exacerbates managerial risk-shifting behavior when firms are highly leveraged. In a similar vein, it is important to note the differences in the leverage composition of compensation packages in understanding their incentive effects. While cash compensation has no leverage component, stock compensation entails hidden leverage derived from the extent of debt employed by the firm. Compensation in the form of stock (call) options contains even more leverage than stock compensation.

Similar to corporate leverage, we expect 'leveraged compensation' to magnify the risk-seeking incentives of executives and directors. This argument is consistent with the findings of Guay (1999) that stock options provide more risk-taking incentives than stock holdings. Therefore, we expect the relation between the agency cost of debt and stock option-based pay to be different from the relation between the agency cost of debt and stock compensation. To the extent that stock compensation increases monitoring incentives of outside directors more than it increases the risk-shifting incentives, we expect debtholders to favor stock compensation for outside directors. In contrast, since risk-shifting incentives provided by options are stronger, we expect that the option compensation could increase the agency costs. In other words, if the risk-shifting incentives provided by stock options exceed the monitoring incentives provided by them, we expect the agency cost of debt to be higher for firms that offer higher levels of option compensation to outside directors. We call this prediction the *form of compensation* hypothesis.

C. Default risk and director EBC

Further, bondholders are aware from the agency literature that the risk-shifting incentives of managers and owners are aggravated when a high-debt firm is under financial distress. This suggests that bondholders would put more value on the stronger monitoring effects of stock compensation for external directors of firms that face increased probability of financial distress. In a related context, Bhojraj and Sengupta (2003) argue that the monitoring role of corporate governance mechanisms might be more important for firms that issue poor quality debt than otherwise. In the same spirit, for firms with high default risk traditional measures of past

profitability and leverage may not be very informative about future cash flows, prompting lenders and rating agencies to rely more on the compensation structure of outside directors of the firm. Therefore, we expect that investors in poorly-rated debt view EBC for outside directors, especially stock grants, more favorably than their counterparts holding high-quality debt. We term this prediction the *default risk mitigation hypothesis.*

D. Investment opportunities and director compensation

Current literature suggests that conflicts between shareholders and bondholders related to investment policy are likely to be more severe for firms with a riskier set of investment opportunities because of higher information asymmetries and increased likelihood of opportunistic behavior from the managers (see Coles et al., 2006). EBC for outside directors has the potential to strengthen board oversight to mitigate such agency problems. Therefore, we expect EBC for external directors, particularly stock grants, to be more important for firms with higher levels of R&D. We term this prediction the *investment monitoring hypothesis*.

II. Data and research method

A. Data

We manually collect bond data from Mergent Bond Record, which provides monthly data on corporate bond yields, issue dates and amounts and Moody's ratings[8]. The source of director compensation data is Execucomp, which provides information on annual cash retainers paid to each director, fees paid to directors for attending board meetings and number of meetings in a year, number of options received by each non-employee director and number of shares of stock (including restricted stock) that were granted to each non-employee director during the year. Board composition data are from The Corporate Library Board Analyst Database and from proxy statements. We start with all the companies in Execucomp database with director compensation

[8] Mergent Bond Record was formerly called Moody's Monthly Bond Record. Klock et al. (2005) use the same data source for debt yields for 2002.

data for the years 2000, 2001 and 2002. Excluding financials and utilities leaves us with 4010 firm-year observations. Among 4010 firm-year observations, yield to maturity data on outstanding corporate bonds is available from Mergent Bond Record for 1035 firm-year observations. The availability of the board of directors data (board independence, board size, director tenure) reduces our dataset to 870 firm-years. Thus, our dataset consists of 870 firm-year observations with annual bond and compensation data available for the years 2000, 2001 and 2002.

B. Research method

1. Measuring agency cost of debt

Although debtholders try to protect themselves against the risk-shifting incentives of managers by requiring protective covenants, the costs of enforcing these covenants and contracting for all contingencies are known to be significant. Furthermore, the previous studies suggest that the effectiveness of bond covenants on firm behavior is limited, especially with respect to risk-shifting incentives. Most bonds have restrictions on dividends and new debt issues but very few impose restrictions on investments (McDaniel, 1986; Anderson et al., 2003). Therefore, bond covenants rarely succeed in completely eliminating stockholder-bondholder conflicts, and bondholders will demand a premium for bearing the agency cost. This suggests that the residual after controlling for other determinants of bond yields (such as maturity, rating, liquidity and issuer characteristics) will impound a premium for the cost of debt arising from agency costs.

We measure the cost of seasoned (outstanding) debt by the yield spread, which is the difference between the weighted average yield on the firm's outstanding debt obligations and the yield on Treasury security with similar maturities[9]. This measure is commonly used for debt risk

[9] We use the end of year yield-to-maturity on company's outstanding corporate bonds to calculate yield spread. We excluded convertible bonds and floating rate bonds from our yield spread calculations.

premium (Duffee, 1998 and Anderson et al., 2003). The yields on Treasury securities pertain to constant maturity series published by Federal Reserve Bank of New York.

2. Compensation and ownership variables

We use measures of the structure of compensation for outsider directors and ownership and structure of compensation for managers as test variables in our analyses. For both directors and managers, we calculate the portion of total compensation granted in the form of stocks and stock options. The ratio of equity-based compensation to total compensation for directors (*Dir. Stock and Option Compensation*) is computed as the value of stock grants plus the Black-Scholes value of options, divided by total compensation. Total compensation is equal to the sum of director meeting fees multiplied by number of meetings, annual cash retainer, and value of stocks and Black-Scholes value of options. To compute the Black-Scholes value of options, we need information about the exercise price and time to expiration. Following Yermack (2004), we assume that exercise price is equal to the average stock price during the grant year and time to maturity is 10 years. We use standard deviation of stock prices over 60 months (BS_VOLATILITY in Execucomp) and the company's average dividend yield for 3 years (BS_YIELD in Execucomp) in our computations. The risk free rate is set equal to the 10-year constant maturity Treasury bond yield as of year end. Due to these assumptions, the Black-Scholes value of options for directors is subject to error[10]. These measures are supplemented by the percentage of total compensation granted in the form of stocks (*Dir. Stock Compensation*) and options (*Dir. Option Compensation*). We also calculate the percentage of stock ownership by

[10] Black-Scholes value of options for directors and managers contain measurement error since Black-Scholes does not incorporate unique characteristics of incentive stock options (i.e. stock options are not traded, are subject to vesting requirements, and directors and managers have limited ability to hedge their wealth).

outside directors (*Dir. Stock Ownership*), but we do not have data on director option ownership. The definitions of these and other variables are presented in Table 1.

[Table 1 about here]

In a similar manner, we calculate the percentage of EBC and equity ownership for top 5 executives. For managers proxy statements provide the number of stock and option grants for that year. For those options, proxy statements also provide exercise price and time to maturity. Therefore, we can calculate Black-Scholes value of these options by just making assumptions about dividend yield and volatility[11]. We define EBC for managers as the ratio of the sum of stock compensation and Black-Scholes value of option compensation to total compensation for that year (*Mng. Stock and Option Compensation*). This is supplemented by the stock and option percentages of total compensation (*Mng. Stock Compensation* and *Mng. Option Compensation*). Further, proxy statements disclose the number of options and stocks held at the end of the year by managers. This allows us to calculate managerial stock ownership by dividing the number of shares held at year-end by the number of shares outstanding (*Mng. Stock Ownership*). To calculate the option ownership, we divide the sum of number of options granted that year plus the number of options unexercised at the end of the year by the number of shares outstanding (*Mng. Option Ownership*)[12]. We also create a measure of stock and option ownership by dividing the sum of numbers of shares and options held by managers by the number of shares outstanding (*Mng. Stock and Option Ownership*).

[11] We use Black-Scholes value of the options provided by Execucomp. Execucomp assume that the volatility is the standard deviation of stock price for 60 months (BS_VOLATILITY) and the dividend yield is the company's average dividend yield for 3 years (BS_YIELD).

[12] These measures are comparable to those used by Ortiz-Molina (2006). He refers to *Mng. Stock and Option Ownership* as ALPHA, *Mng. Stock Ownership* as OWNER and *Mng. Option Ownership* as OPTIONS.

In our analysis we also include measures of the sensitivity of the director and the manager's wealth to 1% change in stock price and 0.01 change in stock price volatility. The calculations of the sensitivity variables follow Core and Guay (2002) and Coles, Daniel, and Laveen (2006). *Dir. Sensitivity to Price* denotes the change in director's wealth (coming from his/her compensation from the firm) for one percentage point change in stock price. *Dir. Sensitivity to Volatility* denotes the change in director's wealth for a 0.01 change in the annualized standard deviation of stock returns[13]. Similarly, we calculate the sensitivities of top executives' wealth to stock price (*Mng. Sensitivity to Price*) and volatility (*Mng. Sensitivity to Volatility*).

3. Control variables

We control for issue characteristics as well as firm characteristics in our multivariate regressions. Following Anderson et al. (2003), we add controls for bond maturity (measured in years), credit ratings, and bond liquidity. The longer the maturity of the bond, the greater will be the interest rate risk, and the higher will be the yield. We use credit ratings to proxy for default risk. A potential problem with using bond ratings as an independent variable is that the effect of outside director EBC may have already been incorporated in the ratings. Recent evidence by Bhojraj and Sengupta (2003) and Ashbaugh et al. (2004) suggests that bond ratings are affected by corporate governance mechanisms. Moreover, Standard and Poor's and Moody's report that they incorporate the strength of governance mechanisms into their ratings. To purge out the effects of compensation, we regress bond ratings on EBC variables for both managers and directors and the governance variables and use the error term from this regression as an independent variable in our tests. The error term will reflect the portion of the ratings not

[13] Since we do not have data on director's option *holdings,* we could only calculate the delta and vega of the options *granted during the year*. Therefore, *Dir. Sensitivity to Price* and *Dir. Sensitivity to Volatility* estimate the sensitivities of director's pay to change in stock price and volatility with error. In contrast, *Mng. Sensitivity to Price* and *Mng. Sensitivity to Volatility* account for cumulative stock and option holdings of managers and hence are more reliable measures of sensitivities of managerial wealth.

explained by compensation and governance variables. Following Anderson et al. (2003), we measure bond liquidity as the length of time that the bond has been outstanding (bond age). Past research has documented that bond prices reflect liquidity premium and more recently issued bonds are more liquid than previously issued bonds (Green and Odegaard, 1997).

Following Anderson et al. (2003) and Ortiz-Molina (2006), we also control for firm characteristics. Larger firms are considered safer investments, since they tend to have more diversified assets and larger asset bases. We measure firm size as the log of total assets. To control for credit risk, we use leverage ratio defined as long term debt divided by total assets. Since more profitable firms are less likely to default, they will be characterized by lower yields. We measure profitability as operating income scaled by total assets (ROA). To control for the risk of the firm, we use the standard deviation of ROA for the past 5 years. Since high growth firms have more risk-shifting incentives, we also control for a firm's growth opportunities. We use Tobin's Q as a measure for growth opportunities.

As Bhojraj and Sengupta (2003) find a negative relation between institutional ownership and the presence of outside directors and bond yields, we also include institutional ownership and percentage of outside directors as control variables in our regressions. Klock et al. (2005) find that shareholder rights as measured by the Gompers, Ishii and Metrick (2003) Index (*G-Index*) is also associated with debt yields. To control for shareholder rights, we use the *G*-Index in our regressions. Anderson et al. (2004) finds that board size and director tenure are significantly correlated to debt yields. Therefore we include these two board characteristics in our regressions. Finally, we include year dummies and Fama-French (1997) industry dummies to control for industry differences.

4. *Summary statistics and preliminary results*

Table 2 presents descriptive statistics for yield spreads, compensation and ownership and control variables[14]. For our sample of 870 firm-years, the average and median yield spreads are around 3.3% and 2.8%[15]. On average, EBC constitutes 59% of total compensation for directors. Option compensation is a much greater percentage of total compensation than stock compensation on average (41% vs. 18%). In our sample, the mean percentage of EBC for external directors is higher than that for managers, which is 54%. Also, managers own 3% of the firm's equity on average, as compared with a mean of 0.94% for outside directors. If we include stock options, their mean equity stake goes up to 7%. The sensitivity of outside directors' wealth to one percent change in stock price is $11,000 at the median. Sensitivity to volatility is much smaller at around $4,000. For managers these numbers are much higher. Sensitivity of top managements' wealth to stock price is $845,000 and sensitivity to stock price volatility is $347,000[16]. The average bond ratings is Baa2 (corresponds to 14 in our scale) and average maturity is 10 years. As for the governance variables, the average institutional ownership is 42%, average percentage of

[14] To reduce the effect of outliers, yield spreads and compensation variables were winsorized at 1% and 99%.

[15] Table 2 also presents the dollar value of stock and option compensation to give an idea about the magnitude of the EBC for outside directors. Outside directors can be granted additional stocks and options upon their nomination. The values of stock and option compensation without the additional grants are also reported. As the table shows, the values of additional options can be substantial. The director compensation variables include the additional stocks and options granted to outside directors. We included these stocks and options in our analysis since they also have incentive effects. We repeated our tests excluding these additional grants. The results are qualitatively similar to those reported in this paper.

[16] Cole et al. (2006) report 80,000 for median *Mng. Sensitivity to Volatility* and 378,000 for *median Mng. Sensitivity to Price*. Our sample has higher dollar value of sensitivities due to the size of the firms. The median sales for Cole et al. (2006) sample is 887 million. For our sample this figure is 4,306 million.

independent directors 69% and the Gompers, Ishii and Metrick (2003) shareholder rights index is 10 on average.

[Table 2 about here]

To get a first look at the link between the agency cost of debt and board and executive compensation in our sample, we present in Table 3 pairwise correlations of director and manager compensation and manager ownership variables with yield spreads. The results suggest that EBC for directors is negatively associated with yield spreads (-23%). Yield spreads are negatively correlated with the percentage of director stock compensation at 14%. Percentage of option compensation is also negatively correlated with yield spreads but the correlation is smaller in absolute value at 9%. As is to be expected, these two forms of EBC are highly negatively correlated, -57%. The sensitivity variables for external directors are negatively correlated with yield spreads similar to compensation variables. As for managerial ownership and compensation variables, we see that the yield spreads are higher for companies with higher levels of option and stock ownership by their managers. The sensitivity variables for managers are also negatively correlated with yield spreads.

[Table 3 about here]

Table 4 provides univariate analysis of director compensation and management compensation and ownership structure and yield spreads. We split the sample is into two groups based on whether compensation and ownership variables are greater or less than the sample median and then test for the difference in mean yield spreads between the two subsamples for each compensation and ownership variable. The test results are broadly consistent with the three hypotheses presented in the last section. In Panel A, the mean and median yield spreads, 3.6% and 2.94% respectively, are higher for firms with lower than the sample median percentage stock and option compensation for outside directors, and the differences are statistically significant.. The differences in medians and means for stock compensation are statistically significant under 1% level. The median (mean) percentage yield spreads for firms with less than the median

percentage stock compensation is 3.02% (3.53%), as compared with 2.47% (2.97%) for firms with greater than the median stock compensation. The next set of tests also shows significant differences in mean and median yield spreads for firms with the percentage of option compensation greater or less than the median. These results provide preliminary evidence that, from the debtholders' perspective, stock compensation strengthens the monitoring incentives of outside directors much more than the options compensation.

[Table 4 about here]

The table also presents results for the sensitivity of external directors' wealth (annual stock and option compensation packages) to changes in stock price and volatility. The results show that yield spreads are significantly higher for firms with less than the median sensitivity to stock price and median sensitivity to volatility.

The univariate tests in Panel B focus on the effects of managerial incentive compensation and equity ownership on the agency cost of debt. Here, we observe that the firms with annual managerial option compensation higher than the sample median have significantly lower yield spreads (3% vs. 3.53%). The managerial *ownership* effects on yield spreads are in sharp contrast to the corresponding *compensation* results. Specifically, we find that the median (mean) yield spread is 3.57% (3.88%) for firms with above-median managerial stock and option ownership, which is significantly higher than the corresponding 2.2% (2.68%) for firms with below-median stock and option ownership (see the bottom third row). We find similar results when we analyze the option and stock ownership separately. Finally, similar to outside director sensitivity variables, we find that yield spreads are higher for firms with less than the median sensitivity of managers' wealth to stock price and median sensitivity of managers' wealth to volatility.

III. Multivariate analysis

A. Determinants of Outside Director Equity-Based Compensation

Firms choose the method of outside director compensation in light of their need for external monitoring to maximize firm value. Before we test the relation between debt related

agency costs and director equity-based compensation, we examine the determinants of director compensation using the Tobit regression specification below:

$$\textit{Director compensation}_i = a_0 + a_1 \textit{Leverage}_i + a_2 Q + a_3 \textit{Dir. Stock Ownership}_i + a_4 \textit{Manager compensation}_i + a_5 \textit{Manager ownership}_i + a_6 \textit{Size}_i + a_7 \textit{Independence}_i + a_8 \textit{Institutions}_i + a_9 \textit{Number of directorships}_i + a_{10} \textit{NOL Dummy}_i + a_{11} \textit{Cash Flow}_i + a_{12} \textit{R\&D Sales}_i + a_{13} \textit{Industry Dummies}_i + \varepsilon_i \quad (1)$$

In the above specification, *Director compensation* represents *Dir. Stock Compensation* and *Dir. Option Compensation*, while *Manager compensation* denotes *Mng. Stock Compensation* and *Mng. Option Compensation* and *Manager ownership* refers to *Mng. Stock Ownership* and *Mng. Option Ownership*. We also repeat the same specifications with sensitivity variables[17].

In choosing the above specification we rely on Bryan et al. (2000), Bryan and Klein (2004) and Yermack (2004) who examine the determinants of equity-based compensation for outside directors. As Bryan and Klein (2004) argue, the greater the leverage, the greater the agency cost of debt. If incentive plans align the interests of outside directors more effectively with those of the shareholders than of the bondholders, equity-based compensation plans, especially stock options, can increase debt-related agency problems. Therefore firms with high leverage might prefer to give lower amounts of options to their outside directors. On the other hand, if debt plays a disciplinary role by reducing overinvestment, firms would need less of the monitoring benefits provided by equity-based compensation. Bryan et al. (2000) and Bryan and Klein (2004) argue that firms with rich investment opportunities are more likely to rely on equity-based compensation. Stock grants, because of their linear payoff structure, may contribute to the underinvestment problem due to managerial risk aversion, stock option grants are more likely to induce the risk-taking incentives for high investment opportunity firms. We use market-to-book

[17] We use natural logs of the sensitivity variables in our analyses to normalize their skewed distributions.

ratio (Q) and R&D over sales as proxies for investment opportunities[18]. It might also be argued that R&D-intensive firms are costlier to monitor and therefore such firms might grant more stock and options to their directors. Firms whose managers hold large fraction of equity might have a reduced demand for additional incentive or monitoring mechanisms. Same argument would also hold for equity-based compensation for managers. Therefore we include *Mng. Stock Compensation*, *Mng. Option Compensation*, *Mng. Stock Ownership* and *Mng. Option Ownership* in our regressions. We also include number of shares owned by outside directors (*Dir. Stock Ownership*) in our regressions. Following Bryan and Klein (2004), we include *Dir. Option Compensation* as an independent variable in the regressions where *Dir. Stock Compensation* is the dependent variable. As Yermack (2004) argues stock option compensation and to a certain extent restricted stock compensation may provide tax advantages. We use an indicator variable which equals 1 if the company has net operating loss carry-forward in its balance sheet, 0 otherwise, to identify firms that cannot take advantage of these tax benefits. Bryan et al. (2000) find that firms with low liquidity are more likely to compensate outside directors with stock-based compensation rather than cash compensation since stock-based compensation conserves cash. Further, firms with high levels of cash flow have more likely equity-related agency costs. We use free cash flow as a measure of liquidity. We measure free cash flow as operating income before depreciation less the sum of income tax, interest and dividends scaled by book value of assets.

As Bryan and Klein (2004) argue, independent directors would provide more effective monitoring, which could reduce the need for equity-based compensation for directors. Institutional investors have fewer free rider problems providing them strong incentives to engage in continuous information gathering of corporate affairs and ensuring that managers undertake value maximizing projects. However managerial myopia is often attributed to institutional

[18] Following Yermack (2004), we set the missing observations for R&D expenditure to zero.

shareholders who actively trade on short-term earnings. To counterbalance this effect, incentive compensation for independent directors may be required. As busy directors might need more incentives for monitoring, we also include average number of directorships in our regressions.

The results of the Tobit regressions are presented in Table 5[19]. The results indicate that higher market to book ratios (Q) are associated with higher director stock and option compensation. Similarly, firms with higher R&D expenditures grant more stock and options to their directors. These results are consistent with the findings of Bryan and Klein (2004). The results are similar for sensitivity variables. Consistent with Yermack (2004), the sensitivities of directors' wealth to stock price and volatility are positively associated with investment opportunities. We also find weak evidence of a negative association between leverage ratio and director stock compensation, but no significant relation between leverage and director stock option compensation.

[Table 5 about here]

Further, firms that offer EBC to their top management tend to extend the incentive compensation to their directors. Institutional ownership and board independence are positively related to stock compensation but not option compensation. This result suggests that independent boards are more likely to align their incentives with shareholders. Average number of directorships held by outside directors is negatively related to director option compensation, but positively related to stock compensation. This result suggests that stock compensation might provide better monitoring incentives than option compensation. Similar to the findings of Bryan and Klein (2004), the results show a strong negative relation between director option

[19] We also ran OLS regressions with the same specifications. The results are qualitatively similar except the following: In the first specification (dependent variables *Dir. Option Compensation*) *size* loses significance; in the second specification (dependent variable Dir. Stock Compensation) *independence* and *Mng. Option Compensation* lose significance; in the third specification (dependent variable *Log (Dir. Sensitivity to Price*)) I*nstitutions* loses significance.

compensation and director stock compensation, suggesting that they might be substitutes. We also find a negative association between managerial stock ownership and stock compensation for directors, suggesting that when managers' incentives are aligned with shareholders, there is less need for the monitoring incentives provided by equity-based compensation for directors. On the contrary, we find that the option ownership of managers is positively associated with director stock compensation, indicating that alignment of incentives is more important when managers own more options.

The results are similar for sensitivity variables. For firms with higher percentage of independent directors, the sensitivity of director's wealth to stock price and volatility are higher. The higher the sensitivity of management's wealth to stock price, the higher is the sensitivity of director's wealth to stock price. Average number of directorships held by outside directors is negatively correlated with the sensitivity variables.

B. Director compensation and yield spreads

To test the cross-sectional relation between director compensation and yield spreads, we run the following regression with director stock and option compensation (*Dir. Stock and Option Compensation*), director stock compensation (*Dir. Stock Compensation*), and director option compensation (*Dir. Option Compensation*) as the primary test variables. In this specification, *Director compensation* represents *Dir. Stock and Option Compensation* or *Dir. Stock Compensation* or *Dir.Option Compensation*, while *Manager compensation* denotes *Mng. Stock and Option Compensation, Mng. Stock Compensation* or *Mng. Option Compensation,* and *Manager ownership* refers to *Mng. Stock and Option Ownership*, *Mng. Stock Ownership* or *Mng. Option Ownership*:

$$\textit{Yield spread}_i = a_0 + a_1 \textit{Director compensation}_i + a_2 \textit{Dir. Stock Ownership}_i + a_3 \textit{Manager compensation}_i + a_4 \textit{Manager Ownership}_i + a_5 \textit{Bond rating residual}_i + a_6 \textit{Size}_i + a_7 \textit{Leverage}_i + a_8 G_i + a_9 \textit{ROA}_i + a_{10} \textit{Std. Dev ROA}_i + a_{11} Q_i + a_{12} \textit{Institution}_i + a_{13} \textit{Years to maturity}_i + a_{14} \textit{Bond}$$

$age_i + a_{15}\ Independence_i + a_{16}\ Board\ size + a_{17}\ Director\ tenure + a_{18}\ Industry\ Dummies_i + a_{19}\ Year\ Dummies_i + \varepsilon_I$ (2)

As noted in Table 1, yield spread is the weighted average corporate bond yield to maturity in excess of the Treasury bond yield with corresponding maturity. The independent variables include compensation variables, bond rating residual, size, leverage, Gompers, Ishii and Metrick (2003) index, ROA, standard deviation of ROA, Tobin's Q, institutional ownership, years to maturity, bond age, percentage of independent directors and Fama-French (1997) industry dummies. Our selection of the control variables is based on related studies by Bhojraj and Sengupta (2003), Klock et al. (2005) and Ortiz-Molina (2006). Positive coefficient estimates on director compensation variables would support the *risk-shifting hypothesis*, while negative coefficient estimates would support the *monitoring hypothesis*.

Beginning with the control variables, we expect the residual bond rating to be negatively related to yield spreads since companies with lower bond ratings will have higher default risk. Size can also be negatively related to yield spreads since larger firms can be safer investments. Yield spreads should be positively related to leverage as higher leverage would indicate higher default risk. We expect the operating income (ROA) to be negatively correlated with spreads and the standard deviation of ROA to be positively correlated. High Tobin's Q would imply higher risk-shifting incentives, therefore should be positively correlated with spreads. Longer maturity securities would have higher spreads. However, the effect of size, leverage, performance, risk and risk-shifting incentives might also be captured by bond ratings. Average age of the firm's bonds should be positively related to yield spreads, as less liquid securities will demand higher yields. As Bhojraj and Sengupta (2003) document, we expect institutional ownership and percentage of independent directors to be negatively correlated with spreads. We also expect the firms with weaker shareholder rights to have lower debt yields (Klock et al., 2005). Given the evidence in Anderson et al. (2004), we expect board size to be negatively correlated and director tenure to be positively correlated with yield spreads.

In our panel dataset covering observations for 870 firm-years, the residuals may be correlated across years (time series dependence – a firm effect) for a given firm. Further, the residuals of a given year may be correlated across different firms (cross-sectional dependence - a time effect). Following Petersen (2006), we use time dummies for 2000 and 2001 to remove the correlation between observations in the same time period and use White (1980) standard errors which are robust to within cluster correlation (Rogers (1993) standard errors)[20].

Table 6 presents the results of OLS regressions. The coefficient estimate for *Dir. Stock and Option Compensation* is -1.64, indicating that the mean yield spread on outstanding bonds drops by 1.64 basis points for a marginal 1% increase in the ratio of director stock and option compensation to total compensation[21]. When we separate the stock and option compensation components, the mean yield spreads decreases by 2.09 basis points for a 1% increase in the ratio of stock compensation to total compensation. In our sample, the median firm with a *Dir. Stock Compensation* equal to 6% pays approximately 12 basis points less on its public debt than firms that do not offer stock compensation to their directors. Moreover, the percentage of option compensation (*Dir. Option Compensation*) is negatively related to yield spreads with a coefficient estimate of -1.58, indicating that the mean yield spread drops by 1.58 basis points at the margin. These results suggest that the monitoring effects of EBC for directors are stronger than the risk-shifting effects resulting in a net effect of a decrease in the cost of public debt. Furthermore, the results are consistent with the *form of compensation hypothesis* which posits that bondholders view stock compensation for outside directors more favorably (i.e., less risk-shifting incentives) than option compensation. A two-tailed test rejects the null hypothesis that the two coefficient

[20] Petersen (2006) also suggests clustering based on year and firm (Thompson (2005) method). We have recalculated the standard errors using this method. The results remain qualitatively similar.

[21] Alternatively, a one standard deviation change in *Dir. Stock and Option Compensation* (0.27, see Table 2) causes a change of 44 basis points in yield spreads on average)

estimates are equal to each other at 5% significance level. In other words, if a firm substitutes option compensation for stock compensation for outside directors, it would face a marginal increase of 0.51 (= 2.09 – 1.58) basis points in yield spreads. Yet another implication of these results is that higher cash compensation for outside directors leads to higher debt costs[22].

[Table 6 about here]

As for managerial compensation, we find significant and negative association between the total managerial EBC (*Mng. Stock and Option Compensation)* and yield spreads. This result suggests that a marginal 1% increase in equity-based compensation for managers decreases yield spreads by 0.53 basis points. In sharp contrast, managerial stock and option ownership, which basically captures *cumulative* compensation awards over top-managements tenure at the firm, is significantly *positively* associated with debt yields. At the margin, a 1% increase in management option and stock ownership will result in 2.59 basis points increase in the mean yield spreads. The estimates reported in the second column suggest that this positive effect is primarily attributable to managerial option ownership (with a coefficient estimate of 10.03), whereas managerial stock ownership significantly negatively related to yield spreads. These findings are consistent with the notion that while rational bondholders regard the *annual option* compensation for top management favorably, they view the *cumulative effects* of the significantly higher pay-performance sensitivity of option compensation as biasing managerial decisions in favor of more risky investment and financial policies. These findings are consistent with the evidence in Ortiz-Molina (2006) whose analysis is limited to managerial equity ownership (and does not cover the effects of managerial compensation on yield spreads).

[22] When we create a cash compensation variable which equals cash compensation divided by total assets and include that in the regressions (instead of equity-based compensation variables), we find that cash compensation for directors is positively associated with yield spreads.

We also examine the cross-sectional relation between yield spreads and the sensitivity of director's wealth (coming from compensation from the firm) to changes in stock price and stock price volatility. The results of the OLS regression are presented in the third column of Table 6. *Log (Dir. Sensitivity to Price)*, which is the sensitivity of directors' wealth to 1% change in stock price, is significantly negatively associated with yield spreads. The coefficient for the directors' sensitivity to stock price volatility is significant at 10% level. Overall these results are in line with the compensation regressions. For managers, the sensitivity of their wealth to a change in stock price (*Log (Mng. Sensitivity to Price)*) is also negatively related to yield spreads, consistent with stock ownership results. However, the coefficient estimate *Log (Mng. Sensitivity to Volatility)* (sensitivity of managers' wealth to stock price volatility) is not significant. These results suggest that the previously noted positive effects of managerial option ownership on yield spreads are attributable to properties other than delta and vega of incentive options.

Turning to the control variables, the coefficient estimate for residual bond ratings is negative and significant. The coefficient estimate for ROA is negative and that for bond age is positive and significant as expected. The coefficient estimate for percentage of independent directors is negative and significant only in the specification with the sensitivity variables. Consistent with Klock et al. (2005), the Gompers, Ishii and Metrick (2003) shareholder rights index (*G-Index*) is negative and significant in all specifications. Consistent with Anderson et al. (2004), we find that larger boards are associated with lower yield spreads. In contrast to Anderson et al. (2004), our results indicate a negative relationship between average director tenure and yield spreads.

It is possible that the relation between ownership, compensation structure and the yield spreads is non-linear. For example, at high ownership levels, managers and directors may deviate from value-maximization; they might become entrenched (Morck et al., 1988). Furthermore, Ortiz-Molina (2006) finds a non-linear association between managerial ownership and at-issue yield spreads. Table 6 Panel B includes squared terms of compensation and ownership variables

to capture possible non-linear effects (for brevity the coefficients of control variables are not reported). We could not find any evidence of non-linear effects for both director compensation and ownership variables[23]. However, the coefficient estimate for the squared term of managerial stock ownership is positive and significant at the 10% level. This result suggests that debt-related agency problems might be higher as managerial stock ownership grows beyond critical levels, indicating higher odds of entrenchment. It could also suggest that debtholders become more concerned about risk-shifting problems at the cumulative effects of stock compensation over the years. The coefficient estimate for the squared term of managerial option ownership is not significant, indicating a linear positive relation between yield spreads and option ownership[24].

C. Debt quality, investment opportunities, and director compensation

Under the *default risk mitigation hypothesis* we expect that investors in poorly-rated debt view EBC for outside directors, especially stock grants, more favorably than their counterparts holding high-quality debt. To test the interaction between debt quality and director compensation, we create a dummy variable which equals 1 if the Moody's average bond rating for the firm is A3 or better, and zero otherwise (*High Grade Dummy*). We interact this debt quality variable with our director compensation variables. A positive coefficient on this interaction variable would indicate that the monitoring incentives of EBC for outside board members are more important for firms with poor debt quality. Table 7 reports the results of these regressions (for brevity the

[23] We have also rerun the regression specification presented in column 3 of Table 6 including squared terms of the sensitivity variables. In untabulated results, the coefficient estimate of Log (*Mng. Sensitivity to Price)* was negative and significant and the coefficient estimate of its squared term was positive and significant. On the contrary the coefficient estimate of L*og (Mng. Sensitivity to Price)* and *Log (Mng. Sensitivity to Volatility)* was positive and significant and the coefficient estimate of its squared term was negative and significant.

[24] These results are different from Ortiz-Molina (2006). He finds a non-linear relation between option ownership and at issue yield spreads.

coefficients of control variables are not reported). The coefficient estimates on the three interaction variables are all positive and significant, suggesting that the monitoring incentives provided by EBC for outside directors are more important for firms with poor debt quality. For example, for firms with low grade bonds, the mean yield spread drops 1.79 basis points for a 1% increase in EBC for outside directors. But the corresponding decrease for firms with high grade bonds is 1.17 basis points (as indicated by the coefficient of 0.62 for *High Grade dummy*Dir. Stock and Option Compensation).*

[Table 7 about here]

Further, we expect the monitoring incentives provided by EBC for outside directors to be more important for firms with higher levels of R&D expenditures. To test this hypothesis, we create an indicator variable which equals 1 if R&D over sales for the firm is greater than the sample median, and zero otherwise. We interact this variable by the outside director compensation variables. The results of these regressions are presented in Panel B of Table 7 (for brevity the coefficients of control variables are not reported). The coefficient on the interaction variables are negative and significant, indicating that the monitoring incentives provided by EBC is more important for firms with higher R&D expenditures. For example, for high R&D firms, the mean yield spread drops by 1.97 basis points for a 1% increase in EBC for outside directors. For low R&D firms, however, the corresponding decrease is 1.32 basis points. Moreover, for high R&D firms stock compensation lowers yield spreads by 2.49 basis points as compared with 1.88 basis points for option compensation.

IV. Robustness checks

A. Endogeneity

The relation between compensation structures and bond yields is much more complex than what we have assumed in the previous analysis. It can be argued that firms change their pay packages for managers and external directors over time in response to many endogenous factors. Based on the costs and benefits of each pay-for-performance mechanism, firms adopt the best

form for their characteristics. In competitive equilibrium, corporate boards would set pay packages optimally to minimize the agency cost of debt, and we would expect yield spreads to be unrelated to the outside director compensation structure. This implies the coefficients on the test variables would be zero in equilibrium. In contrast, extant evidence reviewed earlier seems to suggest that boards may not monitor effectively due to managerial power over the board. Accordingly, many studies assume that the governance regimes in place may be suboptimal and investigate the effects of managerial and board pay schemes on firm performance.

In contrast to the zero equilibrium coefficients, we have so far observed significant negative coefficients on the compensation variables, implying that in the aggregate incentive compensation is underutilized in promoting efficient managerial investments. One potential explanation for the observed negative coefficients is that our empirical regression in (2) is misspecified because director and manager ownership and compensation decisions and the yield spreads are endogenously determined. For instance, John and John (1993) argue that compensation and ownership structures of the firms are determined simultaneously with capital structure. In other words, firms facing high cost of debt might prefer to increase the equity-based incentives for directors and managers. In order to address the issue of endogeneity, we run the following two-stage least squares regression to endogenize the director compensation variables[25]:

$$\textit{Director compensation}_i = a_0 + a_1\,\textit{Leverage}_i + a_2\,Q + a_3\,\textit{Dir. Stock Ownership}_i + a_4\,\textit{Manager compensation}_i + a_5\,\textit{Manager ownership}_i + a_6\,\textit{Size}_i + a_7\,\textit{Independence}_i + a_8\,\textit{Institutions}_i + a_9\,\textit{Number of directorships}_i + a_{10}\,\textit{NOL Dummy}_i + a_{11}\,\textit{Cash Flow}_i + a_{12}\,\textit{R\&D Sales}_i + a_{13}\,\textit{Industry Dummies}_i + \varepsilon_i \quad (3)$$

[25] Following Bryan and Klein (2004), we run two-stage least squares regressions (both stages OLS) rather than first stage Tobit, second stage OLS. As noted in footnote 12, the OLS results are similar to Tobit regression results reported in Table 5.

$$Yield\ spread_i = a_0 + a_1\, Director\ compensation_i + a_2\, Dir.\ Stock\ Ownership_i + a_3\, Manager\ compensation_i + a_4\ Manager\ ownership_i + a_5\ Controls + a_6\, Industry\ Dummies_i + \varepsilon_i, \quad (4)$$

where *Controls* include bond rating residual, size, leverage, G, ROA, standard deviation of ROA, Q, institutional ownership, years to maturity, bond age, percentage of independent directors, board size and director tenure.

Table 8 reports the second stage estimates (for brevity the coefficients of control variables are not reported). Similar to the results reported in Table 6, the outside director EBC is negatively related to yield spreads. While both stock and option compensations lower yield spreads on average, the effect is larger for stock compensation. We also find that the higher the managerial option ownership, the higher are the average yield spreads. These findings suggest that our main results are robust to endogeneity concerns. The results pertaining to the effect of director compensation on investment and non-investment grade debt also hold.

[Table 8 about here]

B. Alternative measures and specifications

Outside directors can be granted additional stocks and options upon their nomination. As Table 2 shows, the values of additional options can be substantial. The director compensation variables used in this paper include the additional stocks and options granted to the outside directors. We included these stocks and options in our analysis since they also have incentive effects. We repeated our tests without including these additional options. The results are qualitatively similar to those reported in the paper.

We repeated the two-stage least squares regressions, with the first stage tobit, second stage ordinary least squares. The coefficient estimates for *Dir. Stock and Option Compensation*, *Dir. Option Compensation*, and *Dir. Stock Compensation* are negative and significant and the coefficient estimate for *High Grade Dummy*Dir. Stock and Option Compensation* is positive and significant similar to two-stage least squares results.

We also ran *change* regressions to further address the endogeneity concerns. The dependent variable in these regressions is the change in yield spread, and the independent variables are the changes in compensation variables, as well as the changes in the control variables. The sample size drops to 427 firms in this analysis. In untabulated results, the coefficient estimates on *Dir. Stock and Option Compensation* and *Dir. Option Compensation* are negative and significant. The estimated coefficient of *Dir. Stock Compensation* is negative but not significant at conventional levels. When we exclude the additional options, however, all three variables (*Dir. Stock and Option Compensation*, *Dir. Option Compensation*, and *Dir. Stock Compensation*) become significant.

V. Conclusion

In this paper we examine how equity-based compensation for external directors affects shareholder-bondholder conflicts. In the past 10 years, there has been a substantial increase in equity-based incentives for outsider directors to align their incentives with those of shareholders. Although there is evidence that equity-based incentives achieve this objective (Fich and Shivdasani (2005)), there is little direct evidence on how EBC for directors impacts bondholders. On one hand, equity-based incentives for external board members increase their monitoring incentives, which would also benefit bondholders. On the other hand, EBC has a side effect in that increases the likelihood of risk-shifting investment and financial decisions, which would hurt bondholders.

We present three important results. First, our findings show that both stock and option compensations for outside directors increase monitoring incentives as compared with cash compensation. Second, the monitoring incentives provided by stock grants to outside board members are stronger than those provided by options, as evidenced by the negative association between the ratio of stock compensation to total compensation and yield spreads. In our sample, a 1% increase in director stock compensation lowers mean yield spreads by 2.09 basis points, while

a similar increase in director option compensation decreases average yield spreads by 1.58 basis points.

Finally, we examine the interaction effects between stock and option compensations for different quality debt and for firms with different levels of R&D expenditures. Our evidence shows that director equity-based compensation is more effective in lowering yield spreads when bond ratings are low and when the firm has high R&D expenditures. In other words, monitoring incentives provided by stock compensation to outside directors are more important when managers have higher levels of risk-shifting incentives.

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Table 1: Variable Definitions

Yield spread	The difference between the weighted average yield on the firm's outstanding debt and the yield on a Treasury security with a similar maturity
Dir. Stock and Option Compensation	[(director stock grants * average stock price during the grant year)+Black-Scholes value of options)]/(Total director compensation)
Dir. Option Compensation	Black-Scholes value of options/total director compensation
Dir. Stock Compensation	(director stock grants*average stock price during the grant year) / total director compensation
Total director compensation	(director meeting fee* number of meetings)+ annual director retainer + (director stock grants * average stock price during the grant year) + Black-Scholes value of options
Dir. Stock Ownership	Number of shares owned by outside directors/Number of shares outstanding
Dir. Sensitivity to Price	sensitivity of outside directors' wealth to 1% change in stock price
Dir. Sensitivity to Volatility	sensitivity of outside directors' wealth to 0.01 change in stock price volatility
Mng. Stock and Option Compensation	(Black-Scholes value of options granted to top 5 executives during the year + value of restricted stock granted during the year)/ total compensation. Total compensation includes salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), long-term incentive payouts, and all other total.
Mng. Option Compensation	Black-Scholes value of options granted to top 5 executives during the year/ total compensation. Total compensation includes salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), long-term incentive payouts, and all other total.
Mng. Stock Compensation	Value of restricted stock granted during the year / total compensation which includes salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), long-term incentive payouts, and all other total.
Mng. Stock and Option Ownership	(Number of shares owned by top 5 executives+ number of stock options granted + number of unexercised options held at year end. (both vested and not vested))/ Number of shares outstanding
Mng. Option Ownership	(Number of stock options granted + number of unexercised options held at year end. (both vested and not vested))/ Number of shares outstanding
Mng. Stock Ownership	Number of shares owned by top 5 executives/Number of shares outstanding
Mng. Sensitivity to price	sensitivity of top management's wealth to 1% change in stock price
Mng. Sensitivity to volatility	sensitivity of top management's wealth to 0.01 change in stock price volatility
Years to maturity	Number of years to maturity (weighted average)
Bond rating	Moody's bond rating converted to a number scale, where Aaa1 is 23 and D is 1.
Bond rating residual	Residual from the regression where the dependent variable is bond rating and independent variables are compensation variables
Bond age	The length of time the bond has been outstanding in months (weighted average)
Size	Log of total assets
Leverage	Long term debt / book value of total assets
ROA	Operating income before depreciation / total assets
Std. Dev. ROA	Standard deviation of ROA from t-6 to t-1
Q	(Market value of equity + Book value of debt) / Book value of assets
Institutions	Percentage of institutional ownership
Independence	Percentage of independent directors (gray directors are excluded)
G-Index	Gompers, Ishii, Metrick (2003) shareholders rights index
Board size	Number of directors on the board
Director tenure	Average director tenure
Number of directorships	Average number of directorships held by outside directors
Cash flow	Operating income before depreciation less the sum of income tax, interest and dividends scaled by book value of assets
NOL dummy	It is a dummy variable which equals 1 if the firm has net operating loss carry-forward in its balance sheet, and 0 otherwise
R&D sales	Research and development expenses divided by sales

Table 2: Summary Statistics

This table presents summary statistics for yield spreads, ownership and compensation variables, and control variables. All variables are defined in

Variable	N	min	quart 1	mean	median	quart 3	max	std. dev.
Yield Spreads (%)	870	0.49	1.78	3.27	2.77	4.23	11.73	2.07
Dir. Stock and Option Compensation	848	0.00	0.43	0.59	0.61	0.80	1.00	0.27
Dir. Stock Compensation	848	0.00	0.00	0.18	0.06	0.31	0.91	0.23
Dir.Option Compensation	848	0.00	0.01	0.41	0.40	0.68	1.00	0.32
Dir. Stock Ownership	870	0.00	0.0003	0.0094	0.0011	0.0036	0.2708	0.0342
Stock Compensation ($000)	870	0.00	0.00	21.68	5.55	29.42	714.89	42.10
Stock Compensation (additional shares excluded) ($000)	870	0.00	0.00	14.85	0.00	22.97	143.46	22.16
Option Compensation ($000)	870	0.00	0.00	98.28	32.36	93.62	3713.99	254.54
Option Compensation (additional options excluded) ($000)	870	0.00	0.00	56.66	24.30	67.15	2374.36	125.74
Cash Compensation	852	0.00	26.00	36.25	36.00	45.00	100.00	16.31
Dir. Sensitivity to Price ($000)	870	0.00	2.51	622.77	10.92	41.35	25780.36	3294.29
Dir. Sensitivity to Volatility($000)	870	0.00	0.00	7.84	3.69	9.63	74.60	12.21
Mng. Stock and Option Compensation	870	0.00	0.39	0.54	0.55	0.70	0.97	0.22
Mng. Stock Compensation	870	0.00	0.00	0.08	0.00	0.12	0.62	0.13
Mng. Option Compensation	870	0.00	0.29	0.46	0.44	0.62	0.94	0.22
Mng. Stock Ownership	870	0.00	0.00	0.03	0.01	0.02	0.37	0.06
Mng. Option Ownership	870	0.00	0.02	0.04	0.03	0.05	0.23	0.04
Mng. Stock and Option Ownership	870	0.00	0.02	0.07	0.04	0.08	0.50	0.08
Mng. Sensitivity to Price($000)	870	1.12	332.04	2430.33	845.39	2015.88	48241.62	5735.00
Mng. Sensitivity to Volatility ($000)	870	0.00	119.25	685.54	347.62	825.27	5860.69	950.20
Years to maturity	870	1.00	5.86	9.96	8.00	12.67	96.00	7.87
Bond rating	870	3.00	11.36	13.70	14.00	16.00	22.00	3.47
Bond age (months)	869	0.00	28.00	48.02	44.00	63.00	163.70	29.20
Size	870	5.69	7.60	8.50	8.33	9.36	12.82	1.21
Leverage	870	0.00	0.18	0.28	0.27	0.36	0.79	0.15
ROA	869	-0.21	0.09	0.14	0.13	0.18	0.72	0.08
Std. Dev. ROA	870	0.001	0.01	0.03	0.02	0.04	0.38	0.03
Q	870	0.64	1.12	1.75	1.39	1.85	12.48	1.17
Institutions (%)	867	0.00	57.70	67.02	68.60	78.24	99.20	16.50
Independence	870	0.11	0.57	0.69	0.71	0.82	1.00	0.17
G-Index	844	3.00	8.00	10.03	10.00	12.00	16.00	2.58
Board size	870	5.00	9.00	10.48	10.00	12.00	21.00	2.45
Director tenure	870	0.00	6.22	8.56	8.17	10.11	24.17	3.55
Number of directorships	870	1.00	1.78	2.28	2.28	2.69	5.00	0.68
NOL dummy	870	0.00	0.00	0.34	0.00	1.00	1.00	0.48
Cash flow	857	-0.51	0.05	0.08	0.08	0.11	0.43	0.06
R&D sales	870	0.00	0.00	0.02	0.00	0.02	0.74	0.05

Table 3: Correlations

This table presents the correlations for yield spread, compensation and ownership variables. All variables are defined in Table 1.

	Yield Spread	Dir. Stk. Opt. Comp	Dir. Stk. Comp	Dir. Opt. Comp	Dir Stk. Own.	Dir. Sen. price	Dir. Sen. Volat	Mng. Stk. Opt. Comp	Mng. Stk. Comp	Mng. Opt. Comp	Mng. Stk. Own	Mng. Opt. Own	Mng. Stk. Opt. Own	Mng. Sen. Price	Mng. Sen. Volat
Yield spread	1.00														
Dir. Stock and Option Compensation	-0.23	1.00													
Dir. Stock Compensation	-0.14	0.18	1.00												
Dir.Option Compensation	-0.09	0.70	-0.57	1.00											
Dir. Stock Ownership	-0.01	0.02	-0.01	0.03	1.00										
Dir. Sensitivity to Price	-0.13	0.07	0.05	0.02	0.71	1.00									
Dir. Sensitivity to Volatility	-0.17	0.51	-0.29	0.64	0.08	0.16	1.00								
Mng. Stock and Option Compensation	-0.17	0.25	0.03	0.19	-0.06	0.11	0.25	1.00							
Mng. Stock Compensation	-0.01	0.03	0.12	-0.06	-0.04	0.03	-0.05	0.32	1.00						
Mng. Option Compensation	-0.16	0.24	-0.04	0.23	-0.04	0.10	0.28	0.81	-0.30	1.00					
Mng. Stock Ownership	0.03	-0.08	-0.18	0.06	0.04	-0.02	0.00	-0.09	-0.12	-0.01	1.00				
Mng. Option Ownership	0.20	0.05	-0.10	0.11	-0.04	-0.12	-0.05	0.13	-0.08	0.18	0.28	1.00			
Mng. Stock and Option Ownership	0.13	-0.03	-0.18	0.10	0.00	-0.07	-0.03	0.00	-0.12	0.08	0.85	0.73	1.00		
Mng. Sensitivity to price	-0.17	0.15	-0.12	0.21	-0.01	0.13	0.27	0.21	-0.05	0.25	0.39	-0.02	0.27	1.00	
Mng. Sensitivity to volatility	-0.25	0.22	0.04	0.16	-0.09	0.06	0.35	0.35	-0.01	0.36	-0.04	-0.04	-0.03	0.47	1.00

Table 4: Mean and Median Difference Tests for Yield Spreads

This table presents mean and median yield spreads (%) sorted by whether the stock and option compensation for directors and managers are below or above the sample median. Panel A presents results for directors and Panel B for managers. The table also reports p-values from t-test for means and Wilcoxon rank-sum test for median. All variables are defined in Table 1.

Panel A: Directors

	Dir. Stock and Option Compensation			
	>Median	<Median	Difference	p-value
Mean	2.90	3.60	-0.70	0.00
Median	2.61	2.94	-0.33	0.00
N	424	424		
	Dir. Stock Compensation			
	>Median	<Median	Difference	p-value
Mean	2.97	3.53	-0.56	0.00
Median	2.47	3.02	-0.55	0.00
N	424	424		
	Dir.Option Compensation			
	>Median	<Median	Difference	p-value
Mean	2.99	3.51	-0.52	0.00
Median	2.72	2.89	-0.17	0.01
N	424	424		
	Dir. Sensitivity to Price			
	>Median	<Median	Difference	p-value
Mean	2.50	4.04	-1.54	0.00
Median	2.20	3.64	-1.45	0.00
N	435	435		
	Dir. Sensitivity to Volatility			
	>Median	<Median	Difference	p-value
Mean	2.75	3.79	-1.04	0.00
Median	2.44	3.21	-0.77	0.00
N	435	435		

Panel B: Managers

	>Median	<Median	Difference	p-value
Mng. Stock and Option Compensation				
Mean	3.01	3.52	-0.51	0.00
Median	2.50	2.96	-0.46	0.00
N	435	435		
Mng. Stock Compensation				
Mean	3.33	3.22	0.11	0.42
Median	2.81	2.74	0.07	0.44
N	384	486		
Mng. Option Compensation				
Mean	3.00	3.53	-0.53	0.00
Median	2.46	3.06	-0.60	0.00
N	435	435		
Mng. Sensitivity to Price				
Mean	2.58	3.95	-1.37	0.00
Median	2.28	3.37	-1.09	0.00
N	435	435		
Mng. Sensitivity to Volatility				
Mean	2.54	3.99	-1.45	0.00
Median	2.28	3.57	-1.29	0.00
N	435	435		
Mng. Stock and Option Ownership				
Mean	3.88	2.68	1.20	0.00
Median	3.57	2.20	1.37	0.00
N	427	443		
Mng. Stock Ownership				
Mean	3.66	2.91	0.75	0.00
Median	3.31	2.31	1.00	0.00
N	417	453		
Mng. Option Ownership				
Mean	3.91	2.62	1.29	0.00
Median	3.40	2.17	1.23	0.00
N	438	432		

Table 5: Determinants of Director Equity-Based Compensation: Tobit Regressions

This table presents the results of Tobit regressions on director stock and option compensation. *Log(Dir. Sensitivity to Price), Log (Dir. Sensitivity to Volatility), Log (Mng. Sensitivity to Price),* and *Log (Mng. Sensitivity to Volatility)* are the natural logs of Dir. Sensitivity to Price, Dir. Sensitivity to Volatility, Mng. Sensitivity to Price, and Mng. Sensitivity to Volatility, respectively. All other variables are defined in Table 1. All models include year dummies and Fama-French (1997) industry dummies, but the coefficients of the dummies are not reported. *p*-values based on bootstrapped standard errors are in brackets. *, **, *** denote significance at 10%, 5% and 1% levels, respectively.

	Dir. Option Compensation	Dir. Stock Compensation	Log (Dir. Sensitivity to Price)	Log (Dir. Sensitivity to Volatility)
Leverage	-0.05	-0.15	-0.64	-0.19
	[0.63]	[0.09]*	[0.14]	[0.67]
Q	0.05	0.04	0.37	0.17
	[0.00]***	[0.03]**	[0.00]***	[0.00]***
Log (Dir. Sensitivity to Price)				0.12
				[0.00]***
Log (Mng. Sensitivity to Price)			0.31	0.10
			[0.00]***	[0.18]
Log (Mng. Sensitivity to Volatility)			-0.07	0.06
			[0.06]*	[0.14]
Dir. Option Compensation		-0.69		
		[0.00]***		
Dir. Stock Ownership	0.20	0.55		
	[0.69]	[0.03]**		
Mng. Stock Compensation	-0.06	0.18		
	[0.58]	[0.03]**		
Mng. Option Compensation	0.2	-0.13		
	[0.03]**	[0.05]*		
Mng. Stock Ownership	-0.26	-0.96		
	[0.43]	[0.00]***		
Mng. Option Ownership	0.2	1.34		
	[0.72]	[0.00]***		
Size	-0.03	0.06	0.23	-0.02
	[0.06]*	[0.00]***	[0.00]***	[0.82]
Independence	0.02	0.19	2.91	1.44
	[0.83]	[0.02]**	[0.00]***	[0.00]***
Institutions	0.00	0.00	-0.01	0
	[0.45]	[0.08]*	[0.09]*	[0.12]
Number of directorships	-0.07	0.06	-0.35	-0.24
	[0.00]***	[0.00]***	[0.00]***	[0.00]***
NOL dummy	-0.01	0.00	0.17	-0.05
	[0.59]	[0.94]	[0.19]	[0.60]
Cash flow	0.51	0.36	0.52	1.64
	[0.10]*	[0.22]	[0.54]	[0.07]*
R&D Sales	1.22	0.85	2.54	3.14
	[0.00]***	[0.00]***	[0.09]*	[0.04]**
Constant	0.32	-0.51	-2.2	-1.11
	[0.13]	[0.00]***	[0.00]***	[0.13]
Observations	832	832	854	854
Prob>chi^2	0.00	0.00	0.00	0.00
Pseudo R^2	0.22	0.59	0.11	0.09

Table 6: Director Compensation and Yield Spreads

This table presents results of OLS regressions on yield spreads. *Log(Dir. Sensitivity to Price), Log (Dir. Sensitivity to Volatility), Log (Mng. Sensitivity to Price),* and *Log (Mng. Sensitivity to Volatility)* are the natural logs of Dir. Sensitivity to Price, Dir. Sensitivity to Volatility, Mng. Sensitivity to Price, and Mng. Sensitivity to Volatility, respectively. All other variables are defined in Table 1. Panel B reports the results of the regression with squared terms. Panel B regression includes the following control variables: *Bond rating residual, Size, Leverage, G-Index, ROA, Std. Dev. ROA, Q, Institutions, Years to maturity, Bond age, Independence, Board size, and Director tenure*. The coefficients of these variables are not reported. All models include year dummies and Fama-French (1997) industry dummies, but the coefficients of the dummies are not reported. *p*-values, which are reported in brackets, are corrected for heteroskedasticity and clustering of observations. *, **, *** denote significance at 10%, 5% and 1% levels, respectively.

Panel A: Director Compensation and Yield Spreads

	(1)	(2)	(3)
Dir. Stock and Option Compensation	-1.64		
	[0.00]***		
Dir. Stock Compensation		-2.09	
		[0.00]***	
Dir. Option Compensation		-1.58	
		[0.00]***	
Dir. Stock Ownership	-0.28	-0.38	
	[0.75]	[0.67]	
Mng. Stock and Option Compensation	-0.53		
	[0.06]*		
Mng. Stock and Option Ownership	2.59		
	[0.00]***		
Mng. Stock Compensation		-0.07	
		[0.84]	
Mng. Stock Ownership		-2.16	
		[0.03]**	
Mng. Option Compensation		-0.98	
		[0.00]***	
Mng. Option Ownership		10.03	
		[0.00]***	
Log (Dir. Sensitivity to Price)			-0.24
			[0.00]***
Log (Dir. Sensitivity to Volatility)			-0.08
			[0.07]*
Log (Mng. Sensitivity to Price)			-0.51
			[0.00]***
Log (Mng. Sensitivity to Volatility)			0.01
			[0.75]
Years to maturity	-0.01	-0.01	-0.01
	[0.27]	[0.31]	[0.43]
Bond rating residual	-0.40	-0.40	-0.39
	[0.00]***	[0.00]***	[0.00]***
Bond age	0.01	0.01	0.00
	[0.00]***	[0.00]***	[0.01]***
Size	-0.13	-0.15	0.08
	[0.03]**	[0.02]**	[0.23]
Leverage	0.56	0.56	0.18

	[0.20]	[0.20]	[0.69]
ROA	-4.07	-4.02	-3.57
	[0.00]***	[0.00]***	[0.00]***
Std. Dev ROA	-0.67	-0.7	0.19
	[0.81]	[0.81]	[0.94]
Q	0.09	0.08	0.21
	[0.15]	[0.17]	[0.00]***
Institutions	0	0	0.00
	[0.72]	[0.29]	[0.18]
Independence	-0.58	-0.43	-0.85
	[0.10]	[0.22]	[0.02]**
G-Index	-0.05	-0.07	-0.08
	[0.03]**	[0.00]***	[0.00]***
Board size	-0.15	-0.12	-0.13
	[0.00]***	[0.00]***	[0.00]***
Director tenure	-0.09	-0.07	-0.02
	[0.00]***	[0.00]***	[0.30]
Constant	8.79	8.83	9.89
	[0.00]***	[0.00]***	[0.00]***
Observations	819	819	839
Adjusted R-squared	0.66	0.66	0.68

Panel B: Squared Terms

	Yield spread
Dir. Stock Compensation	-1.36
	[0.04]**
Dir. Stock Compensation^2	-1.15
	[0.19]
Dir. Option Compensation	-2.07
	[0.00]***
Dir. Option Compensation^2	0.63
	[0.32]
Dir. Stock Ownership	-3.51
	[0.41]
Dir. Stock Ownership^2	12.99
	[0.41]
Mng. Stock Compensation	1.59
	[0.08]*
Mng. Stock Compensation^2	-4.08
	[0.04]**
Mng. Stock Ownership	-6.47
	[0.01]**
Mng. Stock Ownership^2	14.69
	[0.08]*
Mng. Option Compensation	-1.44
	[0.14]
Mng. Option Compensation^2	0.51
	[0.58]
Mng. Option Ownership	7.23
	[0.05]*
Mng. Option Ownership^2	15.08
	[0.41]
Constant	9.33
	[0.00]***
Observations	819
Adjusted R-squared	0.66

Table 7: Director Compensation, High and Low Grade Debt, and R&D

This table presents results of OLS regressions on yield spreads. *High Grade Dummy* is a dummy variable which equals 1 if average Moody's bond rating is greater than or equal to A3 and 0 otherwise. *High Grade Dummy*Dir. Stock and Option Compensation* is an interaction variable of *Dir. Stock and Option Compensation* and *High Grade Dummy.* Similarly *High Grade Dummy*Dir. Stock Compensation* and *High Grade Dummy*Dir.Option Compensation* are interaction variables. *R&D Dummy* is a dummy variable which equals 1 if *R&D/ sales* is greater than the sample median and 0 otherwise. *R&D Dummy*Dir. Stock and Option Compensation* is an interaction variable of *Dir. Stock and Option Compensation* and *R&D Dummy.* Similarly *R&D Dummy*Dir. Stock Compensation* and *R&D Dummy*Dir. Option Compensation* are interaction variables. All other variables are defined in Table 1. All models include year dummies and Fama-French (1997) industry dummies, but the coefficients of the dummies are not reported. All models include the following control variables: *Bond rating residual, Size, Leverage, G-Index, ROA, Std. Dev. ROA, Q, Institutions, Years to maturity, Bond age, Independence, Board size, and Director tenure*. The coefficients of these variables are not reported. *p*-values, which are reported in brackets, are corrected for heteroskedasticity and clustering of observations. *, **, *** denote significance at 10%, 5% and 1% levels, respectively.

Panel A: High and Low Grade Debt

	(1)	(2)
Dir. Stock and Option Compensation	-1.79	
	[0.00]***	
High Grade Dummy*Dir. Stock and Option Compensation	0.62	
	[0.00]***	
Dir. Stock Compensation		-2.32
		[0.00]***
Dir. Option Compensation		-1.71
		[0.00]***
High Grade Dummy*Dir. Stock Compensation		0.66
		[0.05]*
High Grade Dummy*Dir. Option Compensation		0.58
		[0.01]***
Dir. Stock Ownership	-0.49	-0.57
	[0.62]	[0.57]
Mng. Stock and Option Compensation	-0.61	
	[0.03]**	
Mng. Stock and Option Ownership	2.97	
	[0.00]***	
Mng. Stock Compensation		-0.06
		[0.86]
Mng. Stock Ownership		-2.08
		[0.03]**
Mng. Option Compensation		-1.11
		[0.00]***
Mng. Option Ownership		10.99
		[0.00]***
Constant	9.02	9.03
	[0.00]***	[0.00]***
Observations	819	819
Adjusted R-squared	0.66	0.66

Panel B: R&D, Board Compensation and Yields

	(1)	(2)
Dir. Stock and Option Compensation	-1.32	
	[0.00]***	
R&D dummy*Dir. Stock and Option Compensation	-0.65	
	[0.01]***	
Dir. Stock Compensation		-1.46
		[0.00]***
R&D dummy*Dir. Stock Compensation		-1.03
		[0.01]***
Dir. Option Compensation		-1.29
		[0.00]***
R&D dummy*Dir. Option Compensation		-0.59
		[0.02]**
Dir. Stock Ownership	-0.27	-0.35
	[0.77]	[0.70]
Mng. Stock and Option Compensation	-0.51	
	[0.06]*	
Mng. Stock and Option Ownership	2.71	
	[0.00]***	
Mng. Stock Compensation		-0.16
		[0.65]
Mng. Stock Ownership		-2.17
		[0.03]**
Mng. Option Compensation		-0.95
		[0.00]***
Mng. Option Ownership		10.24
		[0.00]***
Constant	8.81	8.85
	[0.00]***	[0.00]***
Observations	819	819
Adjusted R-squared	0.66	0.66

Table 8: Two-Stage Least Squares Regressions

This table presents the second stage results of two-stage least squares regression in which the dependent variable is yield spread and director compensation variables are endogenous. We use cash flow, number of directorships, NOL dummy and R&D Sales as instruments. *High Grade Dummy* is a dummy variable which equals 1 if average Moody's bond rating is greater than or equal to A3 and 0 otherwise. *High Grade Dummy*Dir. Stock and Option Compensation* is an interaction variable of *Dir. Stock and Option Compensation and High Grade Dummy.* All other variables are defined in Table 1. All models include year dummies and Fama-French (1997) industry dummies, but the coefficients of the dummies are not reported. All models include the following control variables: *Bond rating residual, Size, Leverage, G-Index, ROA, Std. Dev. ROA, Q, Institutions, Years to maturity, Bond age, Independence, Board size, and Director tenure*. The coefficients of these variables are not reported. *p*-values, which are reported in brackets, are corrected for heteroskedasticity and clustering of observations. *, **, *** denote significance at 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)
Dir. Stock and Option Compensation	-3.68		-3.69
	[0.02]**		[0.03]**
Dir. Stock Compensation		-4.74	
		[0.02]**	
Dir.Option Compensation		-3.53	
		[0.02]**	
Dir. Stock Ownership	1.01	1.02	0.5
	[0.51]	[0.52]	[0.73]
High Grade Dummy*Dir. Stock and Option Compensation			1.17
			[0.02]**
Mng. Stock Compensation		0.15	
		[0.72]	
Mng. Option Compensation		-1.00	
		[0.04]**	
Mng. Stock Ownership		-3.1	
		[0.01]**	
Mng. Option Ownership		12.31	
		[0.00]***	
Mng. Stock and Option Compensation	-0.34		-0.5
	[0.30]		[0.10]*
Mng. Stock and Option Ownership	2.69		3.34
	[0.00]***		[0.00]***
Constant	9.75	9.53	10.03
	[0.00]***	[0.00]***	[0.00]***
Observations	807	807	807
Adjusted R-squared	0.6	0.59	0.62