Financial Distress Risk and Initial CEO Compensation Contracts

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Abstract

We examine the association between a firm's *ex ante* risk of financial distress and both the level of compensation and the incentives provided to newly hired CEOs. We use a market-based estimate of the probability of bankruptcy based on the Black-Scholes-Merton option pricing model as our measure of financial distress. Our sample is based on 1,367 newly hired CEOs. Our primary findings are as follows. First, new CEOs at firms with moderate to high bankruptcy risk receive between 12% and 40% less compensation (both total direct and cash) compared to new CEOs at low-risk firms. Second, while pay-performance sensitivity is higher for new CEOs whose firms face a substantial bankruptcy risk, the semi-elasticity of CEO pay with respect to shareholder wealth is lower. Finally, our results suggest that there is a negative relation between bankruptcy risk and the ratio of CEO pay-risk sensitivity to semi-elasticity, especially when bankruptcy risk is high and when the new CEO is hired from outside the firm. This finding suggests that newly hired CEOs at firms with moderate to high bankruptcy risk are provided weaker incentives to increase the standard deviation of firm returns, consistent with firms reducing potential shareholder/debtholder agency conflicts.

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1 Introduction

The hiring of a chief executive is one of the most important decisions a board of directors must make. This decision is likely to be especially important in cases where the firm's financial survival is threatened. Recent high-profile examples include the return of founder Steve Jobs to a struggling Apple Computer in 1996 and Conseco's hiring of former General Electric Capital executive Gary Wendt in 2000.

The presence of substantial bankruptcy risk presents boards with a number of potential challenges, in addition to the problem of identifying the best candidate to lead the firm. Boards may have difficulty inducing their top candidates to take the job if the possibility of bankruptcy places substantial risks on the CEO's human capital. Boards may also need to structure incentive compensation arrangements differently for firms facing substantial bankruptcy risk for two reasons. First, the nature of the owner/manager agency problem may change as a firm's financial fortunes decline. Second, bankruptcy risk increases the magnitude of the shareholder/debtholder agency problem. Boards may desire to structure their CEO's employment contract in order to reduce these expected agency costs, which are ultimately borne by the firm's shareholders.

In this paper, we study how firms' employment contracts with newly hired CEOs are related to the bankruptcy risk facing the firm. We rely on a market-based measure of the probability of bankruptcy, BSM-Prob, that is derived from the Black-Scholes-Merton (BSM) option-pricing model and estimated based on the method developed in Hillegeist, Keating, Cram and Lundstedt (2004). Hillegeist et al. (2004) find that BSM-Prob provides significantly more information about the probability of bankruptcy compared to the traditional accounting-based approaches (see, for example, Altman (1968), Ohlson (1980)). There are two main advantages to using a market-based approach compared to an accounting-based approach. First, the stock market provides a potentially superior source of information regarding bankruptcy risk because it aggregates forward-looking financial and non-financial information. Second, the BSM option-pricing model, in particular, provides guidance about the theoretical determinants of bankruptcy risk and supplies the structure needed to extract bankruptcy-related information from market prices.

We use the BSM-Prob measure to perform a cross-sectional empirical analysis of the relation between bankruptcy risk and various aspects of employment contracts for newly hired CEOs.

We construct a sample of 1,367 new CEOs hired by firms in the ExecuComp database between 1992 and May 2002. For each newly hired CEO, we compute the bankruptcy probability measure, BSM-Prob. We then use this measure as one explanatory variable in a series of cross-sectional regressions using properties of CEO pay packages as the dependent variable. Our sample therefore allows us to compare the contracts of newly hired CEOs at firms with substantial bankruptcy risk to their counterparts at firms where the possibility of bankruptcy is more remote.

We examine three main questions. First, we study how the level of CEO pay is related to the bankruptcy risk facing the firm. It is unclear, *ex ante*, how bankruptcy risk and the level of CEO pay should be related. On one hand, high bankruptcy risk implies greater uncertainty regarding the stream of compensation payments the CEO expects to receive both from his current employ as well as from potential future employers if leading a firm into bankruptcy permanently impairs a CEO's reputation. Given executive risk aversion, one might therefore expect higher CEO pay as firms compensate new CEOs up front for the resulting risk premium. On the other hand, various selection effects (discussed below) could result in lower pay levels at high-bankruptcy-risk firms. For example, such firms could hire less risk averse CEOs, who would require smaller risk premiums, and/or employ lower skilled CEOs who have lower reservation wages.

Second, we look at how equity-based incentives for new CEOs are related to bankruptcy risk. We examine both pay-performance sensitivity (the derivative of CEO wealth with respect to shareholder wealth) and the semi-elasticity of pay with respect to shareholder wealth (the change in CEO wealth for a 1% change in shareholder wealth). As discussed in Baker and Hall (2004), pay-performance sensitivity is an appropriate measure of incentives for actions whose effects are constant across firm size, while semi-elasticity is an appropriate measure when CEO actions scale with firm value, such as in strategy selection. If the typical set of CEO actions varies cross-sectionally with bankruptcy risk, then we expect the relation between each incentive measure and bankruptcy risk will be determined based on the firm's primary incentive problem (i.e., inducing actions that do or do not scale with firm size).

Third, we examine the relation between bankruptcy risk and CEO incentives for risk-taking. Since shareholder/debtholder agency conflicts increase with bankruptcy risk, we expect that

shareholders will provide CEOs with differing amounts of risk-taking incentives when the probability of bankruptcy is high. If the firm does not expect to raise much additional debt capital, then high-bankruptcy-risk firms will provide increased incentives for risk taking in order to transfer wealth from existing bondholders to shareholders. However, when high-bankruptcy-risk firms expect to raise new debt capital or renegotiate with current bondholders, they will provide lower risk taking incentives in order to mitigate *ex ante* agency costs. We measure the relation between bankruptcy risk and incentives for risk-taking using the ratio of CEO pay-risk sensitivity to the semi-elasticity of pay with respect to shareholder value (Rogers (2002)). This ratio, which we argue can be interpreted as the slope of an indifference curve in risk-return space, measures the extent to which the contract given to a new CEO rewards risk-taking, thereby countering executive risk aversion and potentially exacerbating shareholder/debtholder conflicts.

Our main results are as follows: First, new CEOs who accept positions with firms that face moderate to high bankruptcy risk receive significantly *lower* initial levels of compensation compared to new CEOs at firms with low bankruptcy risk. This result holds for both cash compensation and total direct compensation, a measure that includes the value of stock and options granted. Our estimates suggest that these differences are economically significant, with new CEOs at such firms receiving between 12% and 40% less compensation. This finding runs counter to the suggestion that CEOs taking over at high-bankruptcy-firms will receive higher levels of pay to compensate for greater risk; instead, it appears that selection issues play a key role in determining pay levels for new CEOs.[1]

Second, while pay-performance sensitivity is higher for newly hired CEOs at firms with a substantial bankruptcy risk, the semi-elasticity of CEO pay with respect to shareholder wealth is lower. We find that pay-performance sensitivity is higher by several dollars per $1,000 change in shareholder wealth, while our estimates of semi-elasticity suggest that new CEOs receive at least $22,000 less per 1% increase in firm value when bankruptcy risk is moderately high. Given that firms with substantial bankruptcy risk are unlikely to have significant free cash flow, it seems rather unlikely that the main agency problem present in such firms would be the sort

[1]The probability of bankruptcy is likely related to the likelihood that a firm chooses to replace its CEO. We find that our main results are robust to controlling for this potential selection issue (see Section 4.4).

of empire-building and perquisite consumption discussed by Jensen (1986). Therefore, it is somewhat surprising that these firms provide higher pay-performance sensitivities. However, this finding is consistent with firms providing increased cost-cutting incentives. The higher levels of semi-elasticity among low-distress-risk firms is consistent with the primary agency problem relating to strategy selecting, possibly to exploit growth opportunities, or similar activities that scale well with firm size.

Third, we find that the ratio of CEO pay-risk sensitivity to semi-elasticity is generally lower for firms with greater bankruptcy risk. This results suggests that CEOs who are newly hired by firms with high bankruptcy risk face *weaker* incentives to increase the standard deviation of firm returns. This finding sheds light on how the well-known potential for shareholder/creditor agency conflicts is reflected in firms' compensation choices. Consistent with the theoretical results in John and John (1993), our results indicate that creditors may be able to indirectly affect CEO pay plans even before bankruptcy becomes a reality. Specifically, if firms with high bankruptcy risk are constrained by the possibility of having to restructure their debts and/or raise new debt capital in the future, then boards may internalize some or all of the expected agency costs in their contract offers to CEOs.

Our paper is perhaps most closely related to the analysis of Gilson and Vetsuypens (1993), who study pay packages for CEOs of 77 severely financially distressed firms in the 1980s. There are two substantial differences between our analysis and theirs. First, our sample consists of all new CEOs present in the ExecuComp data between 1992 and early 2002 regardless of bankruptcy risk. As a result, we are able to compare new CEOs of firms with substantial bankruptcy risk to new CEOs of firms that do not face such risk. The sample in Gilson and Vetsuypens (1993) consists of all CEOs employed (whether newly hired or not) by financially distressed firms, which limits their analysis of new CEOs to a comparison with the CEOs they replaced. They find that new CEOs hired internally tend to be paid less than their predecessors, while externally hired CEOs tend to be paid more. One advantage of our setting is that it allows us to disentangle the effects of financial distress from the effects of normal CEO succession (Fee and Hadlock (2003)). In addition, if financial distress risk is reflected in the old CEO's compensation, it is unclear to what extent the differences in new and old CEOs' compensation documented by Gilson and Vetsuypens (1993) are actually driven by financial distress risk. Our

setting allows us to isolate the effect of financial distress risk on CEO compensation contracts.

Second, the Gilson and Vetsuypens (1993) sample consists of firms that either filed for bankruptcy or underwent a private restructuring of debt. Hence, their analysis is backward-looking in the sense that it studies the effect of current or recent past financial distress on CEO pay packages. Our analysis, which uses an *ex ante* measure of the probability of financial distress, is forward-looking in that it studies the effect of potential *future* distress on pay packages for new CEOs. One important implication of this distinction is the control rights held by creditors. Gilson and Vetsuypens (1993) find, for example, that CEO pay in financially distressed firms is tied specifically to the value of claims held by creditors in at least 10% of cases. Given that bankruptcy transfers at least some control rights to creditors, they may have greater leverage to insure new CEOs are not motivated to take actions that reduce the value of creditors' claims. In our sample, where bankruptcy risk is present but the firm has not yet filed for bankruptcy, creditors are not able to directly affect contract terms. Thus, we are able to focus on how shareholders respond to distress risk when determining CEO compensation packages.

Our research is also related to the large literatures on the determinants of the strength of CEO incentives for risk-taking, and the potential for shareholder/debtholder conflict when bankruptcy risk is substantial. Research on incentives for risk-taking includes Guay (1999), who finds these incentives are positively related to the firm's investment opportunity set. His findings are consistent with the notion that firms structure pay to vary in a convex manner with firm value when the firm wants to motivate investment. Rogers (2002) finds that risk-taking incentives for CEOs are negatively related to net derivatives usage by the firm, consistent with less hedging by CEOs with strong incentives for risk-taking. Coles, Daniel and Naveen (2003) examine the impact of executive equity holdings on current investment decisions. Higher pay-risk sensitivity is associated with higher research and development, higher overall investment, lower capital expenditures, and lower cash holdings. They interpret these changes as shifts to a riskier investment policy. Our paper adds to this literature by examining contractual forms in cases where the shareholders' incentives to encourage risk-taking by managers may be especially strong.

The literature on shareholder/debtholder agency conflicts includes work by John and John

(1993), who develop a theoretical model illustrating how capital structure choices can help mitigate these agency problems. Ahmed, Billings, Morton and Stanford-Harris (2002) and Ortiz-Molina (2003) offer empirical support for the importance of these effects. Ahmed et al. (2002) show that firms use more conservative accounting when leverage is higher, which is indicative of when these agency costs are high. Ortiz-Molina (2003) shows that pay-performance sensitivity appears to be inversely related to leverage. He interprets this finding as consistent with the notion that boards offer more muted incentives to CEOs when the potential for expropriation of creditors' wealth is high. One way in which our analysis contributes to this literature is by offering an improved measure of bankruptcy risk. Leverage is clearly one factor associated with bankruptcy risk; our measure incorporates this factor as well as the other primary determinant of bankruptcy risk, volatility, in accordance with option pricing theory. In addition, we also examine the relation between distress risk and semi-elasticity.

The remainder of the paper proceeds as follows: In Section 2, we discuss the measure of bankruptcy risk developed in Hillegeist et al. (2004). We discuss our sample of newly hired CEOs in Section 3. In Section 4, we present our analyses of the relations between bankruptcy risk and the level of pay, pay-to-performance incentives, and risk-taking incentives. We conclude in Section 5.

2 Estimating the Probability of Bankruptcy

While much of the prior academic literatures in accounting and finance have used accounting-based measures of bankruptcy risk (predominantly the Z- Score (Altman (1968)) and/or the O-Score (Ohlson (1980))), we instead use a market-based measure that relies on the Black-Scholes-Merton (BSM) option pricing model to estimate bankruptcy risk from equity market data.[2] Hillegeist et al. (2004) find that this approach yields a bankruptcy measure that significantly outperforms the traditional accounting-based measures in explaining the probability of bankruptcy.

Under the BSM approach, equity is viewed as a call option on the firm's assets as the payoffs

[2]Several successful commercial vendors of default probabilities, most notably KMV-Moodys, have followed a similar approach. Also see Vassalou and Xing (2004).

to equity mimic the payoffs to call options. Under the BSM framework, the strike price of the call option is equal to the face value of the firm's liabilities and the option expires at time T when the debt matures. At time T, equity holders will exercise their option and pay off the debtholders if the value of the firm's assets is greater than the face value of its liabilities. Otherwise, equity holders will let their option expire, in which case the firm files for bankruptcy and the debtholders take over. The probability of each outcome is embedded in the BSM model.

The BSM equation for valuing equity as a European call option on the value of the firm's assets is given in Equation (1) below. This equation is modified for dividends and includes an additional term that is necessary because it is the equity holders that receive the dividends.[3]

$$V_E = V_A e^{-\delta T} N(d_1) - X e^{-rT} N(d_2) + (e^{(\delta - r)T} - e^{-rT}) V_A \tag{1}$$

V_E is the current market value of equity, V_A is the current market value of assets, X is the face value of debt maturing at time T, r is the continuously compounded risk-free rate, δ is the continuous dividend rate expressed in terms of V_A, σ_A is the standard deviation of asset returns, and $N(d_1)$ and $N(d_2)$ are the standard cumulative normal of d_1 and d_2, respectively, where

$$d_1 = \frac{\ln\left[\frac{V_A}{X}\right] + \left(r - \delta + \frac{\sigma_A^2}{2}\right) T}{\sigma_A \sqrt{T}} \text{ and } d_2 = d_1 - \sigma_A \sqrt{T}.$$

Under the BSM model, the probability of bankruptcy is equal to the probability that the market value of assets, V_A, is less than the face value of the liabilities, X, at time T (i.e., $V_A(T) < X$). Under the assumptions of the model, the probability that $V_A(T) < X$ is as follows:

$$N\left(-\frac{\ln \frac{V_A}{X} + (\mu - \delta - \frac{\sigma_A^2}{2})T}{\sigma_A \sqrt{T}}\right) = BSM\text{-}Prob, \tag{2}$$

where μ is the continuously compounded expected return on assets. Equation 2 shows that the probability of bankruptcy is a function of the distance between the current value of the firm's assets and the face value of its liabilities $\left(\frac{V_A}{X}\right)$ adjusted for the expected growth in asset values

[3]This term does not appear in the traditional call option equation for a dividend-paying stock because dividends do not accrue to option holders.

$(\mu - \delta - \frac{\sigma_A^2}{2})$ relative to asset volatility (σ_A).

To empirically estimate BSM-Prob from Equation (2), we use the following procedure developed in Hillegeist et al. (2004). In the first step, we estimate the unobservable market value of assets, V_A, and asset volatility, σ_A by simultaneously solving the call option equation (Equation (1)) and the optimal hedge equation: $\sigma_E V_E = V_A e^{-\delta T} N(d_1)\sigma_A$. V_E is set equal to the total market value of equity based on the closing price at the end of the month prior to when the new CEO is hired. σ_E is computed using daily return data from CRSP over the preceding twelve months. The strike price X is set equal to the book value of total liabilities based on the most recent quarterly financial statements, r is the one-year Treasury bill rate, and T is set equal to one year. The dividend rate, δ, is the sum of common and preferred dividends and interest expense over the preceding twelve months divided by the approximate market value of assets, which is defined as total liabilities plus the market value of equity. We solve the two equations simultaneously for the two unknown variables, V_A and σ_A, where the starting value for V_A is equal to book value of liabilities plus the market value of equity and the starting value for σ_A is $\frac{\sigma_E V_E}{V_E + X}$.

In the second step, we estimate the expected market return on assets, μ, based on the actual return on assets during the previous year. In cases where the actual return on assets was negative, we set the expected growth rate equal to the risk-free rate. In addition, we set the maximum growth rate at 100%. While one could use a more sophisticated method to estimate the expected growth rate in asset values, Hillegeist et al. (2004) report that their results are not sensitive to the exact method of calculating μ.[4] Thus, $\mu(t)$ is calculated as follows:

$$\mu(t) = \min\left[1, \max\left[\frac{V_A(t) + \text{Dividends} - V_A(t-1)}{V_A(t-1)}, r\right]\right], \tag{3}$$

where *Dividends* is the sum of the previous years' common and preferred dividends and interest expense.

[4]One possible concern is that our estimates of $\mu(t)$ may be noisy and hence introduce error into our BSM-Prob estimates. As a robustness check, we used the risk-neutral probability of bankruptcy, which simply involves replacing μ with the risk-free rate r in Equation (2). Untabulated results indicate that our inferences with respect to our bankruptcy risk variables remain qualitatively the same, and in some cases are substantially stronger than the results presented in the tables.

Finally, we use the values for V_A, σ_A, μ, δ, T, and X to calculate BSM-Prob via Equation (2) as of the end of the prior month before each new CEO comes into office. We provide summary statistics of this measure for our sample firms below.

3 Data

We identify newly appointed CEOs using the ExecuComp database. We begin by identifying potential CEO turnovers as those firm-years where ExecuComp lists a different CEO in year t than in year $t-1$. For many of the observations, ExecuComp provides a field containing the date the executive became CEO of the firm, "becamece."When we found a potential CEO turnover but the "becamece"field was missing (and the compensation data was available), we hand-collected the date the executive became CEO. We then checked that this date occurred during the year the executive was first listed as CEO. When these dates were inconsistent, we checked both the CEO designation and the CEO's start date using EDGAR and made corrections where necessary. This process yielded 2,020 new-CEO observations for the 1992 - May 2002 time period. Of these, 1,367 observations have the required size, sales, BSM-Prob, and prior CEO data. When we include a set of accounting and market variables as additional control variables, our sample is reduced to 1,258 observations.

Table 1 presents summary statistics for the firms in our sample. For the overall sample, the mean (median) probability of bankruptcy is 1.3% (0.0%). We partition the sample into three groups: low-risk firms with BSM-Prob less than 1%, moderate-risk firms with BSM-Prob values between 1% and 5%, and high-risk firms with BSM-Prob values greater than 5%. We do this because we expect that the association between our compensation variables and bankruptcy risk will be non-linear due to threshold effects. Low-bankruptcy-risk firms make up 84% of the sample, with moderate- and high-risk firms comprising 10% and 6%, respectively. For the high-bankruptcy-risk partition, the mean (median) probability of bankruptcy is 16.7% (9.7%).

We next examine differences in firm characteristics across the bankruptcy risk partitions. We note that mean and median firm size, measured both by sales and number of employees, tends to be lower in the firms with higher bankruptcy risk, except for the median number of employees in the high-bankruptcy-risk group. In unreported tests, we find that the size means are significantly different from one another, although the median number of employees of the

two higher bankruptcy risk partitions are not. Not surprisingly, since both variables are inputs into the BSM-Prob measure, we also find that stock price volatility (measured using the rank of stock price variance over the previous 60 months where available) and leverage (long-term debt divided by total assets) are increasing across our bankruptcy partitions. In addition, both accounting and stock performance is decreasing with bankruptcy risk, where the median prior year's return for the medium (high) bankruptcy risk group is -28.3% (-49.6%). Interestingly, we do not find a clear pattern in sales growth or our cash variables (cash from operations divided by number of employees and cash divided by number of employees) across the bankruptcy risk partitions. Following Ittner, Lambert and Larcker (2003), we include the cash variables as measures of cash constraints.

We present correlations between the firm characteristics in Table 2. As noted above, leverage and stock price volatility are inputs into the BSM-Prob calculation, and both of these variables are significantly positively correlated with BSM-Prob. Several other variables also show the expected relation with the probability of bankruptcy: stock and accounting returns are both negatively correlated with BSM-Prob. As the previous table suggested, we also find a significantly negative relation between BSM-Prob and the size measures, sales and the number of employees. Interestingly, we find only a small correlation between bankruptcy risk and the book-to-market ratio (0.06), which has been viewed as a proxy for financial distress in some prior research (see, for example, the discussion in Daniel and Titman (1997)). We also note that lagged sales growth is not significantly associated with bankruptcy risk, indicating that high-bankruptcy-risk firms are suffering from low profit margins, not declining revenues.

Table 3 presents summary statistics for the sample of newly appointed CEOs. As with the firm characteristics, we present statistics for the entire sample as well as each of the three bankruptcy risk partitions. We first note that both measures of current compensation grants, *TDC* (the log of ExecuComp's "Total Direct Compensation," which includes salary, bonus, the Black-Scholes value of stock option grants, and restricted stock grants), and *TCC* (the log of ExecuComp's "Total Cash Compensation," salary plus bonus), are decreasing across the bankruptcy risk partitions, where higher bankruptcy risk is associated with lower compensation. Unreported analyses indicate that most of these differences are significant, with the exception of TDC between the low- and moderate-bankruptcy-risk partitions. We note that the negative

association between size and bankruptcy risk may explain at least part of this relation. We also present compensation for the firm's previous CEO. Interestingly, while the compensation levels across partitions are also decreasing with bankruptcy risk, the differences between compensation measures for the previous CEO are generally insignificant.

We also present summary statistics for our two incentive measures in Table 3. Pay-performance sensitivity (PPS) is defined as the dollar change in CEO wealth for a $1,000 change in shareholder wealth. Semi-elasticity is defined as the dollar change in CEO wealth for a 1% change in shareholder wealth. Both variables are measured at the end of the executive's first fiscal year as CEO. We note that for both incentive measures, incentives are notably weaker for new CEOs compared to the CEOs they replace. For the new CEOs in our sample, there appears to be a clear pattern in PPS; as bankruptcy risk increases, so does pay-performance sensitivity. The median value of PPS increases from 6.08 for low-risk firms to 9.75 for moderate-risk firms to 18.15 for high-bankruptcy-risk firms. Interestingly, this pattern is weaker for the firm's previous CEO, which may result from CEO compensation being fairly sticky over time, so that the prior CEO's incentives do not fully reflect the current probability of bankruptcy. In contrast, semi-elasticity decreases rapidly as we increase bankruptcy risk, both for the newly appointed CEO and the firm's previous CEO, although the mean differences are not significant. Our final incentive measure, MRS, is the ratio of CEO pay-risk sensitivity (as defined by Guay (1999)) to semi-elasticity. We discuss this measure in more detail below. MRS shows no monotonic pattern across the three bankruptcy risk partitions. Mean and median MRS is highest in the moderate-risk firms and is lowest in the low-bankruptcy-risk firms.

The last column of Table 3 shows the percentage of newly appointed CEOs who are hired from outside the firm. We define External to equal one if the new CEO was not a current or former employee or a director of the firm. In our overall sample, 14.5% of new CEOs are hired from outside the firm. The percentage of outsiders hired is highest for the firms with moderate bankruptcy risk (25.4%), which is significantly higher than the percentage for the low bankruptcy-risk firms. The firms with highest bankruptcy risk hire outsiders 17.7% of the time. This number falls between the rates of the other two groups, and is not significantly different from either of them.

We provide some additional information about the external hires in our sample in Table 4.

We find 232 newly hired CEOs who were not either current employees of the firm or became CEO by virtue of a merger. Of these 232 CEOs, 34 were current directors of the firm, and 14 of the 34 were also former employees. The remaining 198 CEOs are the executives classified as External. For 155 of these outside CEOs, we are able to find Compustat data. Another 17 are from private firms, 12 are from foreign firms, 11 come from consulting or law firms, and two are from universities or foundations. We do not have any details about one external CEO. For the CEOs that came from Compustat or private firms, we find that 32 were CEOs at their previous firm, another 32 were "high-ranking" (defined to be CFO, COO, or President), and 108 were "low-ranking" (defined to be any other executive position, including a high-ranking position at a division or subsidiary).

Table 4 also provides some descriptive information about the external CEOs' previous firms. For example, the stock return at these previous firms averaged 20.9% in the fiscal year before the executive became CEO at his new firm. The firms that new CEOs leave tend to be larger than their new firms: mean sales and assets are \$16 and \$31 billion, respectively, compared to \$4 and \$9 billion for our sample firms. We define indicator variables to equal one if the new CEO's previous firm was larger than his new firm; 79% (80%) of the new CEOs in our sample came from larger firms as measured by sales (assets) than their new firms. The difference in size is primarily explained by the fact that many new CEOs were CEOs or presidents of divisions at large firms; only 20% of the external CEOs were CEOs or high-ranking executives at a larger firm than their new firm.

4 Analysis and Results

In this section, we analyze the relation between bankruptcy risk and the contracts given to newly hired CEOs. We conduct a cross-sectional analysis examining three characteristics of contracts for new CEOs: the level of pay, the pay-to-performance incentives, and the ratio of pay-risk sensitivity to the semi-elasticity of pay-to-performance.

4.1 Bankruptcy Risk and Pay Levels

Our expectations regarding the link between new CEO pay and bankruptcy risk are governed by two opposing factors. All else equal, new CEOs at firms with substantial bankruptcy risk

will require higher levels of compensation because of their greater human capital risk. As Fama (1980) has noted, an executive's on-the-job actions affect not just the payments he receives from his current employer, but also likely affect the executive's reputation in the labor market and hence his potential compensation from future employers. If bankruptcy at the current employer would dampen the CEO's future employment prospects, then this source of job-related risk would increase the risk premium that a risk-averse CEO attaches to the job. Employers must compensate employees for job-related risk, so this factor should lead CEO pay to be higher for firms with substantial bankruptcy risk. Cannella, Fraser and Lee (1995) examine the effects of firm failure on managerial careers using a sample of Texas banks. They find that managers of failed banks are less likely to find banking posts than managers from non-failed banks, although the impact is lessened if the failure is viewed to be beyond the manager's control. However, even these "innocent bystander" managers were 63% less likely to find banking posts compared to managers at non-failed banks. Thus, the stigma of being a manager at a failed firm appears to be quite significant, regardless of the degree of culpability. We expect that these types of reputation costs will be even larger for CEOs of bankrupt firms, even when the initial risk of bankruptcy was already high. Supporting this view, Gilson (1989) finds that top managers of poorly performing firms are substantially more likely to be replaced when their firms become financially distressed. In addition, none of the replaced managers from distressed firms are employed by a public firm over the next three years.

Countering this effect is the possibility that the selection of CEOs hired by high-bankruptcy-risk firms differs from that of CEOs hired by low-bankruptcy-risk firms. Selection effects could arise from several sources in this setting. Consider first the "endogenous matching" phenomenon discussed by Ackerberg and Botticini (2002). If firms that impose the greatest human capital risk on employees attract extremely risk-tolerant employees, then it is possible that such firms would actually pay *lower* risk premia to their employees. This selection effect would at least mitigate if not reverse the risk argument given above. Second, if the marginal return to executive ability is lower in firms with substantial bankruptcy risk, then these firms may hire CEOs with less attractive outside opportunities and lower reservation wages. Third, high-bankruptcy-risk firms may require a different set of skills compared to firms with lesser risk. For example, if the supply of managers with turnaround or cost-cutting skills is relatively high, while the supply

of managers with the strategic skills necessary to take advantage of growth opportunities is relatively low, then high-bankruptcy-risk firms may pay lower overall wages compared to low-risk firms.

To assess the relation between bankruptcy risk and pay levels, we run a series of cross-sectional regressions using the log of various compensation measures as the dependent variables. The dependent variable in our basic specification is the log of total direct compensation (*TDC*) measured in the CEO's first year on the job.[5] Our main explanatory variables of interest are the categories of the BSM-Prob variable introduced above, *PB-Mod* (BSM-Prob between 1% and 5%) and *PB-High* (BSM-Prob greater than 5%). Other independent variables include the log of firm sales in the prior year (*LogSales*), an indicator for whether the new CEO was hired from outside the firm (*External*), and year indicators (not reported). We also include the log of the previous CEO's TDC in the prior year as an additional control for firm-specific characteristics not captured by the other explanatory variables (*PrevCEO_TDC*). This last variable is especially powerful as it controls for a whole host of firm-specific factors (i.e., unobserved heterogeneity) that also determine compensation contracts.[6] We estimate this specification using ordinary least squares with robust standard errors, and present results in Column (1) of Table 5.

We find that new CEOs of firms with bankruptcy risk greater than 1% earn substantially less than new CEOs of firms with bankruptcy risk less than one percent. The coefficients on our *PB-Mod* and *PB-High* variables are -0.210 and -0.315, respectively, and both are statistically significant at the 1% level. These coefficients indicate that new CEOs at firms with a moderate (high) risk of bankruptcy earn approximately 21% (32%) less than their counterparts at low-

[5]We use compensation from the CEO's first year in the position because we are interested in capturing the CEO's initial compensation package. A potential complication with this choice is that the reported numbers may reflect only a partial year's pay. This issue is most relevant for cash compensation since salary is most likely to be prorated. To analyze the robustness of our results, we conduct all tests using compensation from the executive's second year (first full year) as CEO. Although the sample size is reduced by roughly 300 observations, we find larger and more statistically significant effects for our bankruptcy risk variables in the TDC regressions. The BSM-Prob estimates in the TCC regressions are somewhat smaller and less significant.

[6]Including the previous CEO's compensation amount reduces the power of our tests to the extent that bankruptcy risk is correlated over time and is reflected in the prior CEO's compensation.

bankruptcy-risk firms. While the point estimate for the *PB-High* variable is larger, an F-test reveals the estimate is not different from the *PB-Mod* coefficient. Combining the two BSM-Prob indicators into a single variable yields a more significant result, as the estimate of the coefficient on the combined BSM-Prob indicator has a p-value less than 0.01.

The results for the other explanatory variables conform to our expectations based on previous work. Pay is higher for new CEOs who are hired into large firms, and who replace highly paid departing CEOs. Our elasticity of pay with respect to sales of 0.18 is notably lower than that found in most of the literature; Rosen (1992), for example, reports that a pay-size elasticity of around 0.30 is perhaps the most robust finding in all the executive compensation literature. This difference is attributable to our inclusion of the *prior* CEO's pay, which is clearly itself correlated with firm size. When we omit the prior CEO's pay from the regression, the overall explanatory power of the regression decreases markedly, but the inferences regarding the BSM-Prob variables generally strengthen and the coefficient on *LogSales* ranges from 0.29 to 0.37. Consistent with Gilson and Vetsuypens (1993), we find that new CEOs hired from outside the firm receive higher TDC (by approximately 90%) compared to those hired from inside. In alternate specifications, we include an interaction between the outsider and bankruptcy risk indicators and find the interaction terms to be insignificantly different from zero.

In Column (2), we retain the log of total direct compensation as a dependent variable but add additional control variables that prior literature has found to explain compensation grants. Following Ittner et al. (2003), we include book-to-market and sales growth to capture the investment opportunity set, prior stock and accounting returns to measure past performance, log employees as an additional size measure, and two cash variables to capture cash constraints, the ratio of cash from operations to employees and the ratio of cash to employees. We also include leverage and ranked stock return volatility, as both variables have been found to have explanatory power for compensation and incentive measures (see, for example, Aggarwal and Samwick (1999) and Jin (2002)). Since leverage and volatility are (nonlinear) input variables into BSM-Prob, including these variables is quite conservative as it biases us against rejecting the null hypothesis for our bankruptcy variables. For variables that are available only annually, we take the value at the end of the fiscal year prior to the new CEO's hiring.

We reestimate the model using OLS with robust standard errors and including the additional

control variables. Despite the correlation between the additional controls (specifically, leverage and volatility) and our bankruptcy probability indicators, we find that the significance level for *PB-Mod* has increased. New CEOs hired into firms with moderate levels of bankruptcy risk receive pay that is almost 30% lower, *ceteris paribus*, than that obtained by CEOs who are hired into firms with low bankruptcy risk. This point estimate is statistically different from zero at the 1% level. When bankruptcy risk is greater than 5%, CEOs earn 25.7% less compared to those with risk less than 1%. This point estimate is also significant (p-value = 0.09), but with a lower t-statistic compared to the one in Column (1). It is somewhat surprising that the point estimate for *PB-High* is slightly less than that for *PB-Mod*, but our tests again show that these point estimates are not significantly different from each other. Firm size, prior CEO pay, and external hires affect pay in much the same way as in the Column (1) regression. Examining our additional controls, we find book-to-market, stock volatility, leverage, and cash to employees all have significant effects on TDC. We also find that the prior year's stock return is positively associated with *TDC* (p-value = 0.06), which is somewhat surprising given that past performance is unlikely to be attributed to the new CEO. The other control variables are not significant.

Next, we repeat these analyses using total cash compensation (*TCC*) as a dependent variable. Column (3) repeats the Column (1) specification, while Column (4) repeats Column (2). In Column (3), we find that newly hired CEOs earn 12.8% less (p-value = 0.10) when bankruptcy risk is between one and five percent, and 40.1% less (p-value = 0.02) when risk is greater than 5%, as compared to newly hired CEOs at firms with low risk. Notably, while we found that external CEOs receive higher total direct compensation compared to those promoted internally, external CEOs make almost 20% *lower* total cash compensation than their internal counterparts. This suggests that a large fraction of the total direct compensation for new outside CEOs is equity grants; presumably CEOs promoted from within already hold some equity stake. These large grants made to outsiders are therefore likely intended to give these CEOs a similar equity stake to those candidates promoted from within.[7] We revisit this question in our pay-to-performance tests below. As before, in supplementary tests, we find no significant

[7]An alternative interpretation is that the large equity grants to external CEOs are designed to replace the value of options and stock that were forfeited when the CEO left the prior firm (Fee and Hadlock (2003)).

coefficients on interactions between the outsider and bankruptcy risk variables.

The additional controls in Column (4) reduce the size of our point estimates and significance levels somewhat, but not our key findings. We find that new CEOs in firms with moderate bankruptcy risk receive pay that is 6.4% lower compared to new CEOs in firms with low bankruptcy risk, but this point estimate is not significant. New CEOs in firms with high bankruptcy risk receive pay that is 37.9% lower compared to new CEOs in firms with low bankruptcy risk. This estimate remains significant at the 6% level. The additional control variables have less explanatory power for *TCC* than for *TDC*, with the exception of return on assets and the ratio of cash to employees, both of which are significant. Interestingly, volatility and leverage do not have significant effects on *TCC*.

In Columns (5) through (8), we perform generalized least squares regressions of pay on our bankruptcy variables and controls. This procedure, which we implement with Stata's rreg command, places less weight on extreme observations. We continue to find that both *TDC* and *TCC* are significantly lower when bankruptcy risk is higher. In Column (6), for example, we find that *TDC* is 23% and 24% lower at firms with moderate and high bankruptcy risk, respectively. The coefficients on both BSM-Prob variables are significant here at below the 4% level. As before, combining the two bankruptcy probability variables into a single indicator yields a much lower p-value of 0.01. For *TCC* in Column (8), we find somewhat puzzling results: pay is 21% lower for new CEOs joining firms with moderate bankruptcy risk (compared to those who join firms with low risk), but only 12% lower for those joining firms with high risk. The coefficient on *PB-Mod* is significant at far better than the 1% level, while *PB-High* is only significant at the 9% level.[8] Again, we find that outside CEOs receive much higher *TDC* compared to those promoted from within, but this pattern is much less notable with cash compensation only.

Broadly, these results suggest that new CEOs hired by firms facing substantial bankruptcy risk receive *lower* levels of compensation compared to firms that face minimal bankruptcy risk. This finding holds whether we use total direct compensation or total cash compensation as our measure of pay level. This finding extends the conclusion of Gilson and Vetsuypens (1993), who

[8]The results for Column (7) without the additional controls indicate that the differences in coefficients are much smaller (-0.213 vs. -0.171), and both coefficients are significant at the 0.01 level.

report that internally promoted CEOs of financial distressed firms tend to earn less than the prior CEO. One difficulty in interpreting their result is the possibility that internally promoted CEOs earn less than the predecessor *regardless* of the firm's financial position. This result could obtain if, for example, CEO pay levels are positively related to tenure. Our finding, which explicitly compares new CEOs hired by firms that face varying degrees of bankruptcy risk, confirms that bankruptcy risk itself is associated with lower pay for new CEOs.

Further, Gilson and Vetsuypens (1993) report that outside CEOs in financially distressed firms make *more* than their predecessors. However, we find that while external hires generally earn substantially more total direct compensation than inside hires, external hires at moderate and high-bankruptcy-risk firms still earn substantially less than externally hired counterparts at low-risk firms. Our analyses suggest that the pay premium reported by Gilson and Vetsuypens (1993) appears to be driven by an outsider effect that is unrelated to the firm's financial position. Higher bankruptcy risk appears instead to be associated with lower pay for all new CEOs regardless of where they came from.

In summary, our findings support the idea that selection plays a key role in determining pay for new CEOs. Standard arguments using managerial risk aversion suggest that, fixing the identity of the manager, higher pay would be required in order to accept a situation that involved substantial human capital risk. Our results suggest that the characteristics of managers hired by high-bankruptcy-risk firms must differ in important ways from those of managers hired by firms facing minimal bankruptcy risk, and that these characteristics lead to lower pay levels.[9]

4.2 Bankruptcy Risk and Pay-to-Performance Incentives

In this section, we examine the relation between bankruptcy risk and the performance incentives arising from the equity holdings of new CEOs. We focus our attention on two measures of CEO incentives. The first is pay-performance sensitivity, which is the derivative of CEO wealth with

[9]We have tried in various ways to link these differences in characteristics to the backgrounds of the managers hired in our sample. Following Hayes and Schaefer (1999) and Fee and Hadlock (2003), we gathered data on the size and stock returns of the firms that *previously* employed the new CEOs in our sample (see Table 4). We expect these variables to be positively related to the managers' perceived skill levels and opportunity sets. To date, we have not uncovered any notable patterns in this limited data.

respect to shareholder wealth, typically stated in terms of the dollar change in CEO wealth associated with a $1,000 change in shareholder wealth. The second is the semi-elasticity of CEO wealth with respect to shareholder wealth, which is the dollar change in CEO wealth for a 1% change in shareholder wealth.[10]

It is the production "technology" in the agency relationship that determines whether pay-performance sensitivity or semi-elasticity is the most appropriate measure of CEO incentives. Suppose we hold CEO characteristics constant and assume the marginal effect on firm value of CEO effort is constant across firms. Under this assumption, one unit of CEO effort leads to the same dollar change in firm value across different firms. Then firms with the highest pay-performance sensitivity will motivate the highest effort levels. On the other hand, suppose the marginal effect on firm value of CEO effort is linearly increasing in firm value. This would imply, for example, that one unit of effort leads to the same *percentage* change in firm value across firms. Then firms with the highest semi-elasticity of pay with respect to shareholder wealth will motivate the highest effort levels. Baker and Hall (2004) argue that if the nature of the owner/manager agency problem is motivating the CEO to forego perquisites such as corporate jets or expensive offices, then CEO effort — interpreted in this case as avoiding consumption of such perquisites — has the same dollar effect independent of firm size. We propose that an analogous argument can be made with respect to cost-cutting efforts, which may be particularly relevant to high-bankruptcy-risk firms. If one unit of cost-cutting effort results in the same dollar reduction in costs regardless of firm size, then the incentives to reduce costs are best measured using pay-performance sensitivity. If instead the primary agency problem involves motivating the CEO to select the best strategy for the firm, then CEO effort may have a greater dollar effect at larger firms. Incentives to select the correct firm strategy may therefore be best measured using semi-elasticity. It is an open question as to which agency problem is relatively more important in high-bankruptcy-risk firms.

We examine both phenomena using cross-sectional analysis. In Table 6, we replicate our specifications from Table 5, this time using pay-performance sensitivity and semi-elasticity of

[10]The *elasticity* of CEO wealth to shareholder wealth — percent change in CEO wealth for a 1% change in shareholder wealth — is not a sensible measure of the strength of incentives, since a change in the *fixed* component of compensation would cause this measure to change without affecting incentives.

CEO wealth to shareholder wealth as dependent variables. In Column (1), we regress pay-performance sensitivity (*PPS*) on our bankruptcy risk indicators, the previous CEO's pay-performance sensitivity (*PrevCEO_PPS*), an indicator for whether the new CEO was hired externally (*External*), the log of sales (*LogSales*), and year indicators. Here, we use OLS with robust standard errors. Our point estimates suggest that pay-performance sensitivity is higher by \$37.47 per \$1,000 of shareholder wealth for firms with substantial bankruptcy risk than for low-risk companies. This figure is significant at better than the 5% level. However, in firms where the predicted bankruptcy probability is between one and five percent, the pay-performance sensitivity coefficient is not significantly different from zero. Not surprisingly, we find pay-performance sensitivity to be higher when the prior CEO's pay-performance sensitivity was higher, when the new CEO is hired from inside the firm, and when the firm is smaller. Adding additional controls, reported in Column (2), reduces the magnitudes on our bankruptcy risk variables, and statistical significance on the *PB-High* coefficient is reduced to the 7% level. Only a few of our additional control variables, including the standard deviation of returns, market return, and leverage, have significant explanatory power at the 10% level. We expect that most of the explanatory power of these controls is subsumed by the prior CEO's compensation variable.

In Columns (5) and (6), we re-estimate these specifications using generalized least squares. Our coefficients here are much more precisely measured, which suggests that outliers were having a large effect on our OLS results. In Column (5), we estimate that new CEOs at firms where the bankruptcy probability is between one and five percent have a pay-performance sensitivity that is higher by \$1.56 per \$1,000 of shareholder wealth, compared to new CEOs at firms where bankruptcy risk is below 1%. This point estimate is significant at the 0.5% level. Similarly, new CEOs at firms where the bankruptcy probability is greater than five percent have a pay-performance sensitivity that is higher by \$4.04 per \$1,000 of shareholder wealth, compared to new CEOs at firms where bankruptcy risk is below 1%. This estimate is also highly significant (p-value < 0.001). Adding the additional control variables in the regression (Column (6)) eliminates the effect for our moderate-bankruptcy-risk firms, but we still find a significant (at better than the 1% level) effect for our high-bankruptcy-risk firms. New CEOs at firms where the bankruptcy probability is greater than five percent have a pay-performance

sensitivity that is higher by $2.09 per $1,000 of shareholder wealth, compared to new CEOs at firms where bankruptcy risk is below 1%. These coefficient estimates indicate that the economic significance of bankruptcy risk on new CEO compensation contracts is substantial, since the median (mean) pay-performance sensitivity for all firms is 6.69 (18.77).

In Columns (3), (4), (7), and (8), we replicate these specifications taking the dependent variable to be the semi-elasticity of CEO wealth with respect to shareholder wealth (*Semi-Elasticity*). The point estimates on our bankruptcy risk variables are all negative, suggesting that incentives, as measured by the semi-elasticity of pay with respect to firm returns, are weaker at firms with substantial bankruptcy risk. In our most complete specifications (Columns (4) and (8)), we obtain significant (at better than the 1% level) and negative coefficients on *PB-Mod*, while the *PB-High* coefficients are not significant. In the OLS regression of Column (4), our point estimate suggests that new CEOs at firms where there is a moderate risk of bankruptcy receive $288,863 less per 1% increase in firm value, compared to new CEOs of firms with low bankruptcy risk.[11] The GLS regression results in Column (8) suggest new CEOs at firms where the bankruptcy probability is between 1 and 5 percent receive $22,725 less per 1% increase in firm value, compared to new CEOs of firms with bankruptcy probabilities of less than 1%.

In unreported specifications, we interacted our BSM-Prob variables with our external indicator. Using PPS as the dependent variable, we found a significantly positive ($p < 0.01$) coefficient on the interaction of *PB-High* and *External* under the GLS specification. This result suggests that pay-performance sensitivity is even higher for CEOs hired from the outside at firms with high bankruptcy risk.

These results present a mixed picture of the strength of new CEO incentives when bankruptcy risk is high. Pay-performance sensitivity for new CEOs is increasing in bankruptcy risk, while the semi-elasticity of pay with respect to shareholder wealth is decreasing in bankruptcy risk. In conjunction with the multi-task model in Baker and Hall (2004), our findings suggest that new CEOs of firms with substantial bankruptcy risk have greater incentives to perform activ-

[11] We note that the R^2s of the regressions in columns (3) and (4) are very high (>0.95). The explanatory power is due almost entirely to the presence of the former CEO's semi-elasticity. When we re-estimate these regressions without this variable, the R^2s decrease to under 0.02. The inferences regarding our BSM-Prob variables are somewhat stronger in this alternate specification.

ities that do not scale with firm size and relatively fewer incentives to focus on activities that do scale with firm size, compared to their counterparts at low-bankruptcy-risk firms. Given the lower levels of free cash flows at high-risk firms, our findings may appear to be somewhat puzzling, as the agency costs associated with perquisites and empire-building are likely to be small for these firms. However, if cost-cutting efforts do not readily scale with firm size, and reducing costs is relatively more important for high-bankruptcy-risk firms, then economic theory suggests that high-risk firms will tend to have higher PPS. In this case, high bankruptcy risk CEOs will benefit more from every dollar of cost savings they produce, and thus, will tend to focus on these activities. Likewise, if the central task for CEOs at bankruptcy-remote firms is devising strategies to take advantage of the firm's growth opportunities, activities which likely scale with firm size, then semi-elasticity should be negatively related to bankruptcy risk. Our evidence is consistent with these interpretations of the primary agency problems facing high and low-bankruptcy-risk firms.

Another possible explanation for the incongruent coefficient signs for the two incentive measures is that firms cannot independently choose both semi-elasticity and pay-performance sensitivity. Consider a firm that has a pay-performance sensitivity of \$X of CEO wealth change per \$1,000 of shareholder wealth change. This firm must also have a semi-elasticity of (X/1000) times one percent of firm value. To see the potential implications of this observation, suppose the only agency problem facing an extremely large firm is consumption of perquisites or empire-building. Then this firm wants to maintain a high pay-performance sensitivity, as this makes it expensive for the CEO to indulge these preferences. Since the firm is large, then as a by-product of having a large pay-performance sensitivity, it will also have a high semi-elasticity. Next, consider a smaller firm that does not face a perquisite-consumption agency problem, but instead faces an agency problem regarding strategy selection. Maintaining a high semi-elasticity is important for this firm, but maintaining a high pay-performance sensitivity is not. One might therefore expect this small firm to have a smaller pay-performance sensitivity, but a larger semi-elasticity compared to the other larger firm. However, it is not possible for the smaller firm to have *both* a smaller pay-performance sensitivity and a larger semi-elasticity compared to the larger firm.

Regardless of the specific reasons for this finding, we can conclude that there is some evidence

of weaker incentives — as measured by semi-elasticity — in firms with higher bankruptcy risk. This offers a challenge to the view that equity-based incentives for new CEOs are stronger when bankruptcy risk facing the firm is greater. This claim, which is highlighted by Gilson and Vetsuypens (1993), is based on a comparison of pay-performance sensitivities before and after corporate debt restructurings. Our analysis does offer some evidence that pay-performance sensitivities are greater for new CEOs at high-bankruptcy-risk firms than at low-bankruptcy-risk firms. However, we also show that the payoff to new CEOs for increasing their firm's stock return by 1% is lower in firms with moderate levels of bankruptcy risk compared to firms with less bankruptcy risk. Recall, however, that agency problems facing a firm as it attempts to emerge from financial distress are likely to be very different from a firm with a substantial, but relatively small, distress risk that wants to prevent bankruptcy.

4.3 Bankruptcy Risk and Incentives for Risk-Taking

Finally, we study the relation between bankruptcy risk and CEO incentives for risk-taking. The possibility of shareholder/debtholder agency conflicts suggests that shareholders might benefit from writing contracts that offer excessive rewards for risk-taking in cases where bankruptcy risk is substantial. Part of the costs associated with such actions are borne by debtholders, and one might think there would be no reason for shareholders and CEOs to internalize this externality in their contracting process. This reasoning is based on a static, *ex post* perspective where the firm has completed its borrowings. In contrast, a dynamic, *ex ante* perspective would suggest the opposite result. Rational lenders to the firm will anticipate such actions by shareholders, and hence expected agency costs are ultimately borne by shareholders. To the extent that high-bankruptcy-risk firms are more likely to either increase their borrowings or renegotiate their debt, shareholders will likely mitigate the expected shareholder/debtholder agency costs by giving their CEOs fewer incentives to increase risk. For levered firms, the compensation contract acts as a precommitment device to minimize the agency costs of debt (John and John (1993)). Thus, even though creditors have no direct influence over the new CEO's compensation contract, the firm may rationally take their interests into consideration by reducing the risk-taking incentives when the probability of bankruptcy is higher.

While a large literature uses pay-risk sensitivity (defined as the derivative of CEO wealth

with respect to the standard deviation of firm returns) to measure the strength of CEO incentives for risk-taking, we follow Rogers (2002) in using the ratio of pay-risk sensitivity to the semi-elasticity of CEO wealth to shareholder wealth. Rogers (2002) argues that this ratio better controls for firm size, since both pay-risk sensitivity and semi-elasticity are related to size. We build on this argument by showing that a richer economic interpretation of this ratio is possible. Specifically, we note that this ratio is the slope of a risk-neutral CEO's indifference curve in risk-return space. Therefore, it is precisely the marginal willingness of a risk-neutral CEO to trade return for risk. Because a risk-averse CEO will look less favorably on risky projects than shareholders would prefer, one can view this ratio as the extent to which shareholders are using stock and option grants to *change* the CEO's preferences regarding risk.

To illustrate this, consider a risk-averse executive who holds only stock. This executive likes projects that increase the firm's return, but dislikes projects that increase the standard deviation of the firm's return. As a result, this executive's indifference curves (graphed in risk-return space) are upward sloping. Risk-neutral shareholders would prefer that the CEO act as though his indifference curves were flat lines; that is, shareholders want the CEO to ignore the risk consequences of his actions. Shareholders can use option grants to reward executive risk-taking, thereby flattening his indifference curves. If such a contract were granted to a risk-neutral executive, it would motivate *excessive* risk-taking by causing the indifference curves to actually slope downwards.

Following standard choice theory, we note that the slope of an indifference curve is equal to the ratio of the marginal utilities of the goods being traded off or substituted. The marginal utility of return to a risk-neutral CEO holding the risk-aversion-counteracting contract is

$$\frac{d \text{ CEO Wealth}}{d \text{ Shareholder Return}},$$

which is exactly the semi-elasticity measure we discussed above. The marginal utility of standard deviation is

$$\frac{d \text{ CEO Wealth}}{d \text{ Standard Deviation}},$$

which is the pay-risk sensitivity measure commonly discussed in the literature. The ratio of

pay-risk sensitivity to semi-elasticity then simplifies to

$$\frac{d \text{ Shareholder Return}}{d \text{ Standard Deviation}},$$

which is exactly the slope of the indifference curve (in risk-return space) of a hypothetical risk-neutral executive who holds the observed contract. Economically, it is the reduction in firm return that a risk-neutral CEO would be willing to accept to increase the standard deviation of the firm's return by 1%. It is useful to examine this ratio because the effects of a high semi-elasticity on executive project selection depend on the executive's pay-risk sensitivity (Li (2004)).

We refer to the ratio of pay-risk sensitivity to semi-elasticity as the MRS (marginal rate of substitution between risk and return) and, following Rogers (2002), use this as the dependent variable in our regressions. A higher value of this ratio means the firm is offering a contract that provides stronger incentives to increase firm risk, thereby countering the executive's risk aversion. We use similar specifications and estimation methods to those presented in Tables 5 and 6 and present our results in Table 7.

In Column (1), we perform an OLS regression (with robust standard errors) of *MRS* on our *PB-Mod* and *PB-High* variables, *External*, the prior CEO's MRS (*PrevCEO_MRS*), *LogSales*, and year indicators. Notably, the probability of bankruptcy bears little relation to MRS — our estimates are small and not significantly different from zero. The prior CEO's MRS is a significant predictor of the new CEO's MRS, as is our indicator for whether the CEO was hired from outside the firm. CEOs hired from outside the firm have an MRS that is 0.177 higher than those hired internally. This suggests that contracts given to externally hired new CEOs reward risk-taking more than contracts given to those promoted from within; recall that MRS measures the return that a risk-neutral CEO would give up in order to increase the standard deviation of the firm's return by 1%. The contracts given to new external CEOs would motivate a risk-neutral CEO to accept a reduction in firm return that is 0.178 percentage points higher in exchange for a 1% increase in standard deviation, compared to contracts given to CEOs who are promoted from within the firm. In Column (2), we add the same set of firm-level controls used earlier. Of these, only the prior year's stock return is significantly related to MRS. While the two BSM-Prob coefficients remain negative and are larger and more significant in this specification,

they are still not significantly different from zero (p-values = 0.13 and 0.11, respectively).

In Column (3), we add interactions between our external-hire indicator and our BSM-Prob variables. Here, we find that in firms with a bankruptcy probability greater than 5%, the MRS variable is significantly lower. Risk-taking incentives given to outside CEOs are significantly weaker when the firm faces substantial bankruptcy risk. Summing the coefficients on *PB-High* and the *PB-High*External* interaction, we find that the MRS is lower by 0.268 for new CEOs hired externally by high-bankruptcy-risk firms compared to externally hired CEOs at low-bankruptcy-risk firms. This point estimate is significant at the 1% level. This effect is so large that it completely counteracts the effect of being an externally hired CEO; we cannot reject the hypothesis that external CEOs hired by high-bankruptcy-risk firms receive the same MRS as internal CEOs hired by minimal-bankruptcy-risk firms. It is perhaps not surprising that our effect is strongest for CEOs hired from outside, as the firm is able to construct these executives' equity holdings "from scratch," whereas CEOs hired internally may already have significant equity holdings at the time of hiring.

Columns (4) through (6) repeat this analysis using generalized least squares. Our inferences with respect to the BSM-Prob variables are generally strengthened, indicating that outliers were having a large effect on our OLS results. Specifically, all three *PB-High* coefficients are significant at the 5% level or better, while *PB-Mod* is significant (p-value = 0.04) in Column (5), which includes the additional control variables. These findings suggest that firms provide less incentives for risk taking when the probability of bankruptcy is relatively high. In addition, our finding of a significant interaction between *PB-High* and our external indicator remains. Our point estimates suggest that the contracts given to external CEOs in high-bankruptcy-risk firms do less to counteract managerial risk aversion. These contracts would motivate a risk-neutral CEO to be less willing (by 0.288 percentage points) to reduce the firm's return in order to get a 1% increase in standard deviation, compared to external CEOs hired by firms with minimal bankruptcy risk. This estimate is significant at the 1% level. Again the estimated effect is so large that it more than counteracts the effect of being an externally hired CEO.

Our results indicate that creditors' interests may indirectly affect the process of contracting with new CEOs, especially in those situations where shareholder/debtholder conflicts are greatest. Thus, our evidence suggests that high-bankruptcy-risk firms at least partially inter-

nalize this externality, especially when they hire an outside CEO. Compensation contracts in these firms feature much weaker incentives for risk-taking compared to contracts between newly hired outside CEOs and firms with lower bankruptcy risk. This finding extends a result offered by Gilson and Vetsuypens (1993). They report that contracts with new CEOs in firms that are in bankruptcy or undergoing a private restructuring often include provisions that explicitly protect the interests of debtholders. Our results suggest that creditors are able to protect their interests as shareholders contract with new CEOs even in cases where bankruptcy is somewhat likely but not yet inevitable.[12] Future research could usefully attempt to understand the precise mechanism by which creditors are able to affect the shareholder/manager contracting process in cases where bankruptcy risk is present.

4.4 Selection Issues

The analyses discussed above focus on the association between a firm's probability of bankruptcy and the compensation contracts offered to new CEOs. We restrict the analysis to new CEO contracts in order to avoid problems associated with endogeneity (since bankruptcy probability will be at least partly determined by prior CEO actions, which are a function of the CEO's contract) and due to the difficulty of separating out the effects of *ex ante* incentives (which is what we are interested in) from the effects of *ex post* performance (which also affect the incentive variables of interest). However, there is another potential econometric difficulty in focusing on new CEOs, since we only observe a new CEO's compensation contract when the previous CEO has been replaced. If the turnover decision is also a function of the probability of bankruptcy, then the BSM-Prob coefficients in the compensation regressions may be biased due to analyzing censored data (Greene (1993)).

To overcome this potential problem, we follow the Heckman two-step procedure (Heckman (1979)). In the first step, we estimate the probability of turnover using a probit model. In the second step, we include the inverse Mills ratio from the turnover model as an additional explanatory variable in the second stage compensation regressions. The key to this procedure

[12] We have excluded any firms that were in technical default or in bankruptcy either at the time the new CEO was hired or within the first six months of his tenure. Doing so precludes this type of direct role in determining the CEO's compensation contract, as examined in Gilson and Vetsuypens (1993).

working well is to have powerful explanatory variables in the turnover model that are not included in the compensation regressions. Doing so will reduce the multi-collinearity between the inverse Mills ratio and BSM-Prob in the compensation regressions.

The sample for the first-stage CEO turnover model is comprised of all firm-year observations in the ExecuComp database that had the necessary data during our sample period. In order to minimize the number of lost observations, we deliberately kept the turnover model simple and only included two predictor variables: CEO age and BSM-Prob.[13] CEO age has been found to be a statistically and economically significant predictor in numerous prior turnover studies, including Borokhovich, Parrino and Trapani (1996), Coughlan and Schmidt (1985), and Engel, Hayes and Wang (2003). In addition, the age of the prior CEO is not expected to affect the compensation contract offered to a new CEO.

The (untabulated) results from this analysis are as follows. Both the CEO age and BSM-Prob coefficients are significantly positive in the turnover regression, as expected. In addition, the inverse Mills ratio is often significantly different from zero in the compensation regressions. However, the inferences with respect to our bankruptcy risk measures discussed above are qualitatively the same in the sense that the coefficient signs and significance levels are unchanged.

5 Conclusion

In this paper, we examine the relation between firms' employment contracts with newly hired CEOs and the bankruptcy risk facing the firm. We estimate bankruptcy risk using a market-based measure of the probability of bankruptcy taken from Hillegeist et al. (2004). We analyze three aspects of compensation contracts for new CEOs: the level of pay, the relation between pay and performance, and the incentives for risk-taking.

We offer three main conclusions. First, higher bankruptcy risk appears to be associated with lower levels of pay for new CEOs. This result holds for both cash compensation and total

[13]We tried several alternative turnover models that included additional predictor variables, such as the industry-homogeneity variable in Parrino (1997). The results from these models were quite similar to the simple, two-variable model and our inferences regarding the associations between bankruptcy risk and compensation contracts were not affected.

direct compensation, and extends to the hiring of new CEOs from outside the firm. This finding runs counter to the suggestion that CEOs taking over high-bankruptcy-risk firms receive higher levels of pay to compensate for greater risk; instead, it appears that selection plays a key role in determining pay levels for new CEOs. CEOs who are willing to accept jobs at high-risk firms may simply have less attractive outside options compared to those who join firms that face minimal bankruptcy risk, perhaps due to differences in skill sets demanded by firms with different levels of bankruptcy risk.

Second, pay-performance sensitivity is higher for newly hired CEOs whose firms face high bankruptcy risk, but the semi-elasticity of CEO pay with respect to shareholder wealth is lower. This implies that if the personal cost to CEOs of increasing shareholder wealth by $X is constant across firms, then CEOs of high-bankruptcy-risk firms have stronger incentives to create value. If, on the other hand, the personal cost to CEOs of increasing shareholder wealth by x% is constant across firms, then CEOs of low-bankruptcy-risk firms face *weaker* incentives to enhance firm value. We conjecture that these results are driven by the different nature of the agency problem faced by firms with different levels of bankruptcy risk.

Third, we find that externally hired CEOs at higher-risk firms have weaker incentives to pursue risky projects. These results are based on an examination of the ratio of pay-risk sensitivity to semi-elasticity, which we argue is equal to the marginal rate of substitution between risk and return for a risk-neutral CEO. While theoretical literature has suggested that shareholders would be especially interested in rewarding risk-taking by CEOs to allow them to expropriate creditors, we find the reverse. Our finding suggests that creditors may effectively influence the contracting process with new CEOs when bankruptcy risk is present, as suggested by John and John (1993).

In ongoing work, we are exploring several avenues. First, we are continuing to examine the backgrounds of the new CEOs in our sample. Our results are consistent with the hypothesis that CEOs at high-bankruptcy-risk firms have lesser labor market opportunities; this may imply differences in backgrounds across CEOs. Second, we plan on examining any differences in new CEOs' *ex post* decision making in order to make inferences regarding the type of skill sets demanded by firms with different levels of bankruptcy risk.

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Table 1: Summary Statistics: Firm Variables

	BSM-Prob	LogSales	BM	SalesGr	StdRet	Return	ROA	LogEmp	Leverage	CFO/Emp	Cash/Emp
All firms											
Mean	0.013	7.171	0.523	0.143	0.400	0.116	0.065	1.895	0.200	0.038	0.052
Median	0.000	7.123	0.439	0.075	0.358	0.033	0.069	1.880	0.182	0.017	0.007
StDev	0.056	1.609	0.688	0.389	0.190	0.610	0.144	1.593	0.171	0.122	0.247
N	1,367	1,367	1,227	1,227	1,227	1,227	1,227	1,227	1,227	1,227	1,227
Firms with BSM-Prob < 0.01											
Mean	0.001	7.266	0.467	0.134	0.365	0.168	0.084	1.969	0.192	0.042	0.054
Median	0.000	7.225	0.426	0.080	0.330	0.071	0.075	1.933	0.173	0.019	0.007
StDev	0.002	1.596	0.318	0.293	0.173	0.581	0.121	1.590	0.159	0.128	0.266
N	1,154	1,154	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043
Firms with 0.01 >= BSM-Prob < 0.05											
Mean	0.024	6.833	0.694	0.225	0.559	-0.083	0.011	1.626	0.201	0.013	0.033
Median	0.021	6.652	0.610	0.082	0.532	-0.283	0.029	1.511	0.194	0.009	0.005
StDev	0.011	1.560	0.594	0.627	0.149	0.769	0.148	1.499	0.172	0.035	0.071
N	134	134	119	119	119	119	119	119	119	119	119
Firms with BSM-Prob >= 0.05											
Mean	0.167	6.364	1.116	0.137	0.660	-0.341	-0.128	1.211	0.324	0.016	0.045
Median	0.097	6.357	0.796	-0.007	0.643	-0.496	-0.037	1.609	0.292	0.003	0.011
StDev	0.169	1.599	2.514	0.875	0.167	0.478	0.267	1.616	0.283	0.120	0.086
N	79	79	65	65	65	65	65	65	65	65	65

Financial variables measured in year prior to new CEO's appointment. BSM-Prob = Black-Scholes-Merton measure of the probability of bankruptcy, measured in the month prior to new CEO's appointment. LogSales = log of sales (millions). BM = book to market ratio. SalesGr = sales growth. StdRet = volatility of stock return. Return = fiscal year stock return. ROA = return on assets. Leverage = long-term debt divided by total assets. LogEmp = log of number of employees (thousands). CFO/Emp = Cash from operations divided by number of employees. Cash/Emp = Cash divided by number of employees.

Table 2: Correlations

	BSM-Prob	LogSales	BM	SalesGr	StdRet	Return	ROA	LogEmp	Leverage	CFO/Emp	Cash/Emp
BSM-Prob	1.0000										
LogSales	-0.0971	1.0000									
	0.0003										
BM	0.0631	0.0135	1.0000								
	0.0196	0.6169									
SalesGr	-0.0226	-0.1031	-0.0135	1.0000							
	0.4052	0.0001	0.6180								
StdRet	0.4429	-0.3313	0.0278	0.2189	1.0000						
	0.0000	0.0000	0.3105	0.0000							
Return	-0.1752	-0.0222	-0.2354	0.1779	0.0724	1.0000					
	0.0000	0.4275	0.0000	0.0000	0.0106						
ROA	-0.2229	0.1919	-0.0875	0.2328	-0.2764	0.1844	1.0000				
	0.0000	0.0000	0.0012	0.0136	0.0000	0.0000					
LogEmp	-0.0983	0.8858	-0.0034	-0.1298	-0.2882	-0.0323	0.1544	1.0000			
	0.0003	0.0000	0.9019	0.0000	0.0000	0.2516	0.0000				
Leverage	0.1679	0.0709	0.0406	-0.0091	-0.0236	-0.1089	-0.1720	0.0761	1.0000		
	0.0000	0.0088	0.1344	0.7363	0.3895	0.0001	0.0000	0.0109			
CFO/Emp	-0.0188	0.0224	-0.0132	-0.0266	-0.0427	0.0154	0.1165	-0.1656	0.0707	1.0000	
	0.4979	0.4200	0.6345	0.3382	0.1290	0.5854	0.0000	0.0000	0.0109		
Cash/Emp	0.0354	-0.0635	-0.0031	0.0532	0.0679	0.0697	-0.0561	-0.1558	-0.0989	-0.1497	1.0000
	0.1930	0.0196	0.9099	0.0507	0.0137	0.0132	0.0392	0.0000	0.0003	0.0000	

p-values presented below correlations. Financial variables measured in year prior to new CEO's appointment. BSM-Prob = Black-Scholes-Merton measure of the probability of bankruptcy, measured in the month prior to new CEO's appointment. LogSales = log of sales (millions). BM = book to market ratio. SalesGr = sales growth. StdRet = volatility of stock return. Return = fiscal year stock return. ROA = return on assets. Leverage = long-term debt divided by total assets. LogEmp = log of number of employees (thousands). CFO/Emp = Cash from operations divided by number of employees. Cash/Emp = Cash divided by number of employees.

Table 3: Summary Statistics: Executive Variables

	TDC	PrevCEO_ TDC	TCC	PrevCEO_ TCC	PPS	PrevCEO_ PPS	Semi-elas	PrevCEO_ Semi-elas	MRS	PrevCEO_ MRS	External
All firms											
Mean	7.781	7.443	6.453	6.697	18.772	31.130	489.850	1333.285	0.438	0.291	0.145
Median	7.689	7.344	6.520	6.685	6.685	12.368	84.248	155.683	0.424	0.229	0.000
StDev	1.268	1.113	1.005	0.801	57.165	58.451	5443.749	19953.526	0.304	0.263	0.352
N	1,357	1,357	1,367	1,367	1,297	1,297	1,297	1,297	1,236	1,236	1,367
Firms with BSM-Prob < 0.01											
Mean	7.817	7.468	6.528	6.758	15.603	29.301	542.757	1474.756	0.429	0.275	0.130
Median	7.725	7.371	6.566	6.745	6.079	10.904	97.772	170.976	0.410	0.214	0.000
StDev	1.250	1.093	0.920	0.793	41.021	55.705	5907.298	21669.103	0.302	0.258	0.336
N	1,146	1,146	1,154	1,154	1,098	1,098	1,098	1,098	1,055	1,055	1,154
Firms with 0.01 >= BSM-Prob < 0.05											
Mean	7.725	7.363	6.203	6.438	23.736	43.024	212.782	671.726	0.510	0.386	0.254
Median	7.654	7.153	6.119	6.329	9.752	19.985	57.827	123.694	0.496	0.415	0.000
StDev	1.293	1.242	0.925	0.695	45.719	72.122	794.882	2302.554	0.283	0.267	0.437
N	131	131	134	134	125	125	125	125	117	117	134
Firms with BSM-Prob >= 0.05											
Mean	7.371	7.216	5.776	6.239	57.410	38.174	173.324	351.669	0.462	0.384	0.177
Median	7.334	6.962	5.916	6.209	18.151	20.344	23.182	55.184	0.464	0.369	0.000
StDev	1.409	1.153	1.750	0.866	165.742	69.616	605.356	1121.635	0.356	0.283	0.384
N	80	80	79	79	74	74	74	74	64	64	79

TDC = log of total direct compensation of new CEO. PrevCEO_TDC = log of total direct compensation of firm's previous CEO. TCC = log of total cash compensation of new CEO. PrevCEO_TCC = log of total cash compensation of firm's previous CEO. PPS = dollar change in CEO wealth per $1,000 change in firm value. PrevCEO_PPS = PPS of firm's previous CEO. Semi-elas = dollar change in CEO wealth per 1% change in firm value, divided by 1,000. PrevCEO_Semi-elas = Semi-elasticity of firm's previous CEO. MRS = pay-risk sensitivity/semi-elasticity. PrevCEO_MRS = PRS/semi-elasticity of firm's previous CEO, multiplied by 1,000. External = 1 if new CEO is outsider.

Table 4: External CEOs

Panel A: Previous Employment of New External CEOs

		Previous Position		
	Total	CEO	High Rank	Low Rank
Compustat firm	155	23	32	100
Private firm	17	9	0	8
Foreign firm	12			
Law/Consulting	11			
University/Foundation	2			
No details	1			
Total	198			

Panel B: Descriptive Statistics for External CEOs' Previous Firms

	Return	Sales	Assets	Relative Sales	Relative Assets
Mean	0.209	15,685.43	31,001.94	0.79	0.80
Median	0.185	5,670.88	4,848.10	0	0
N	144	155	155	155	155

Financial variables measured at executive's previous firm in fiscal year prior to executive's appointment as CEO of new firm. Sales, Assets in $millions. High Rank = CFO, COO or President. Low Rank = Other, including high-ranking positions at subsidiary. Relative Sales = 1 if sales at previous firm > sales at CEO's new firm, 0 otherwise. Relative Assets = 1 if assets at previous firm > assets at CEO's new firm, 0 otherwise.

Table 5: Determinants of Annual Compensation for New CEOs

	OLS				GLS			
	TDC		TCC		TDC		TCC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PB-Mod	-0.210^b	-0.297^a	-0.128^c	-0.064	-0.131	-0.230^a	-0.213^a	-0.212^a
	-2.06	-2.72	-1.65	-0.80	-1.57	-2.62	-4.38	-4.04
PB-High	-0.315^b	-0.257^c	-0.401^b	-0.379^c	-0.212^b	-0.238^b	-0.171^a	-0.124^c
	-2.35	-1.72	-2.25	-1.89	-2.05	-2.02	-2.79	-1.71
External	0.907^a	0.841^a	-0.193^b	-0.195^b	0.895^a	0.815^a	0.066	0.087^b
	11.54	11.13	-2.28	-2.29	12.84	11.69	1.61	2.05
PrevCEO_TDC	0.486^a	0.370^a			0.554^a	0.435^a		
	11.66	8.91			20.62	15.32		
PrevCEO_TCC			0.374^a	0.360^a			0.429^a	0.393^a
			8.33	8.15			17.83	14.76
LogSales	0.180^a	0.268^a	0.196^a	0.159^a	0.168^a	0.277^a	0.163^a	0.137^a
	6.96	5.79	8.71	4.31	9.24	7.11	13.86	5.89
BM		-0.180^a		-0.047		-0.164^a		-0.018
		-3.14		-0.97		-4.85		-0.87
SalesGr		0.099		-0.013		0.027		-0.069^c
		1.12		-0.24		0.42		-1.86
StdRet		0.830^a		-0.118		0.939		0.023
		6.72		-1.09		8.32		0.34
Return		0.121^c		-0.015		0.063		0.024
		1.94		-0.33		1.49		0.92
ROA		-0.321		-0.354^b		-0.173		-0.183^c
		-1.45		-2.04		-0.95		-1.68
LogEmp		0.056		0.047		0.028		0.052^b
		1.23		1.09		0.74		2.36
Leverage		-0.641^a		-0.260		-0.425^a		-0.050
		-3.82		-1.41		-2.90		-0.57
CFO/Emp		0.279		0.249		0.476^b		0.218
		0.94		1.28		2.03		1.54
Cash/Emp		0.314^a		0.289^a		0.357^a		0.310^a
		2.73		3.74		3.69		5.26
N	1,357	1,251	1,367	1,258	1,298	1,251	1,367	1,258
R^2	0.43	0.49	0.37	0.39				

t-statistics calculated using robust standard errors. Financial variables measured in year prior to new CEO's appointment. TDC = log of total direct compensation of new CEO. TCC = log of total cash compensation of new CEO. PB-Mod = 1 if BSM probability of bankruptcy between 0.01 and 0.05. PB-High = 1 if BSM probability of bankruptcy greater than 0.05. External = 1 if new CEO is outsider. PrevCEO_TDC = log of total direct compensation of firm's previous CEO. PrevCEO_TCC = log of total cash compensation of firm's previous CEO. LogSales = log of sales. BM = book to market ratio. SalesGr = sales growth. StdRet = volatility of stock return. Return = fiscal year stock return. ROA = return on assets. Leverage = long-term debt divided by total assets. LogEmp = log of number of employees. CFO/Emp = Cash from operations divided by number of employees. Cash/Emp = Cash divided by number of employees. Year indicators included in regressions. *a*, *b*, and *c* denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.

Table 6: Determinants of Incentive Intensity for New CEOs

	OLS				GLS			
	PPS		Semi-elasticity		PPS		Semi-elasticity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PB-Mod	4.259	-1.676	-97.885	-288.863^{a}	1.566^{a}	0.230	-26.725^{a}	-22.725^{b}
	0.95	-0.35	-0.97	-3.09	2.74	0.37	-3.14	-2.54
PB-High	37.468^{b}	33.088^{c}	-26.741	-91.962	4.037^{a}	2.092^{a}	-33.847^{a}	-19.093
	2.03	1.81	-0.29	-0.70	5.61	2.45	-3.16	-1.57
External	-8.338^{a}	-10.300^{a}	-118.906^{b}	-140.608^{a}	1.283^{a}	0.966^{c}	-5.454	-0.017
	-3.91	-4.04	-2.55	-2.79	2.67	1.93	-0.76	-0.00
PrevCEO_PPS	0.186^{a}	0.210^{a}			0.033^{a}	0.027^{a}		
	3.52	3.60			11.67	8.83		
PrevCEO_Semi-elas			0.265^{a}	0.268^{a}			0.098^{a}	0.097 ^{a}
			45.16	175.74			129.16	90.56
LogSales	-2.987^{a}	-2.685	44.069^{c}	-27.023	-1.648^{a}	-1.509^{a}	19.754^{a}	15.652^{a}
	-3.73	-1.13	1.79	-0.44	-15.49	-5.66	12.64	4.13
BM		-2.750		-12.028		0.749^{a}		-14.714^{a}
		-0.80		-0.65		2.94		-4.05
SalesGr		-10.562		152.439		-2.399^{a}		-6.568
		-1.60		1.48		-5.15		-1.00
StdRet		14.267^{c}		191.836		6.046^{a}		16.877
		1.90		1.39		7.52		1.48
Return		-5.167^{c}		-38.117		0.298		3.275
		-1.85		-0.48		0.96		0.74
ROA		8.818		-146.299		1.920		7.593
		0.72		-0.63		1.48		0.41
LogEmp		-0.265		104.477^{c}		0.266		11.450^{a}
		-0.11		1.69		1.02		3.08
Leverage		28.176^{b}		-5.644		-0.281		-33.445^{b}
		1.97		-0.03		-0.27		-2.24
CFO/Emp		0.747		793.554		-1.490		-8.514
		0.04		1.45		-0.87		-0.35
Cash/Emp		0.552		338.373^{a}		0.860		214.457^{a}
		0.11		2.44		1.24		21.58
N	1,297	1,203	1,297	1,203	1,297	1,203	1,296	1,202
R^2	0.09	0.11	0.95	0.96				

t-statistics calculated using robust standard errors. Financial variables measured in year prior to new CEO's appointment. PPS = dollar change in CEO wealth per $1,000 change in firm value. Semi-elasticity = dollar change in CEO wealth per 1% change in firm value, divided by 1,000. PB-Mod = 1 if BSM probability of bankruptcy between 0.01 and 0.05. PB-High = 1 if BSM probability of bankruptcy greater than 0.05. External = 1 if new CEO is outsider. PrevCEO_PPS = PPS of firm's previous CEO. PrevCEO_Semi-elas = Semi-elasticity of firm's previous CEO. LogSales = log of sales. BM = book to market ratio. SalesGr = sales growth. StdRet = volatility of stock return. Return = fiscal year stock return. ROA = return on assets. Leverage = long-term debt divided by total assets. LogEmp = log of number of employees. CFO/Emp = Cash from operations divided by number of employees. Cash/Emp = Cash divided by number of employees. Year indicators included in regressions. *a*, *b*, and *c* denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.

Table 7: Determinants of MRS for New CEOs

	OLS			GLS		
	(1)	(2)	(3)	(4)	(5)	(6)
PB-Mod	-0.008	-0.047	-0.040	0.001	-0.057^{b}	-0.048
	-0.29	-1.54	-1.14	0.05	-2.10	-1.56
PB-High	-0.037	-0.088	-0.041	-0.067^{b}	-0.152^{a}	-0.115^{a}
	-0.76	-1.61	-0.66	-1.96	-4.18	-2.86
External	0.177^{a}	0.175^{a}	0.195^{a}	0.168^{a}	0.153^{a}	0.172^{a}
	6.50	6.53	6.11	7.75	7.36	7.42
PB-Mod*External			-0.031			-0.036
			-0.53			0.63
PB-High*External			-0.227^{a}			-0.173^{b}
			-2.64			-2.14
PrevCEO_MRS	0.413^{a}	0.396^{a}	0.392^{a}	0.476^{a}	0.475^{a}	0.474^{a}
	11.98	11.60	11.41	16.53	16.79	16.76
LogSales	-0.005	-0.000	0.000	-0.005	0.006	-0.006
	-0.95	-0.03	0.04	-0.99	0.50	-0.54
BM		-0.014	-0.015		0.018^{c}	0.017
		-0.43	-0.46		1.70	1.60
SalesGr		-0.018	-0.020		-0.009	-0.010
		-0.96	-1.09		-0.47	-0.52
StdRet		-0.013	-0.014		0.043	0.042
		-0.34	-0.35		1.27	1.24
Return		-0.131^{a}	-0.131^{a}		-0.184^{a}	-0.184^{a}
		-3.92	-3.90		-14.92	-14.93
ROA		-0.037	-0.041		-0.026	-0.029
		-0.77	-0.85		-0.60	-0.66
LogEmp		-0.008	-0.009		-0.008	-0.008
		-0.72	-0.76		-0.73	-0.75
Leverage		0.126	0.124		0.026	0.025
		1.60	1.60		0.60	0.58
CFO/Emp		-0.093	-0.091		-0.089	-0.086
		-1.43	-1.39		-1.22	-1.18
Cash/Emp		-0.042	-0.042		-0.045	-0.045
		-1.49	-1.50		-1.36	-1.35
N	1,236	1,153	1,153	1,236	1,153	1,153
R^2	0.21	0.29	0.29			

t-statistics calculated using robust standard errors. Financial variables measured in year prior to new CEO's appointment. MRS = pay-risk sensitivity/semi-elasticity. PB-Mod = 1 if BSM probability of bankruptcy between 0.01 and 0.05. PB-High = 1 if BSM probability of bankruptcy greater than 0.05. External = 1 if new CEO is outsider. PrevCEO_MRS = PRS/semi-elasticity of firm's previous CEO, multiplied by 1,000. LogSales = log of sales. BM = book to market ratio. SalesGr = sales growth. StdRet = volatility of stock return. Return = fiscal year stock return. ROA = return on assets. Leverage = long-term debt divided by total assets. LogEmp = log of number of employees. CFO/Emp = Cash from operations divided by number of employees, divided by 1,000. Cash/Emp = Cash divided by number of employees, divided by 1,000. Year indicators included in regressions. *a*, *b*, and *c* denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.