

Do Stock Options Encourage Managers to Take Risk?

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Abstract

The empirical results derived from our fixed effects model provide no support for a linkage between a CEO's stock option grant and future firm risk. We find, using the panel corrected error term methods (PCSE) that control for the heteroscedasticity and autocorrelation, that current period stock option awards do have a positive effect on future firm risk. From the PCSE model we also find that the current year's market risk premium has a statistically significant negative effect on firm risk. The paper shows that changes in an executive's base salary can be used to mitigate the influence that stock option grants have on future firm risk. Of particular importance to shareholders is our finding that the firm's future risk profile increases with CEO tenure, suggesting that CEOs adopt more aggressive strategies over time.

I. Introduction

In this paper, we explore factors that influence firm risk. Central to the paper is the partial derivative of the option price with respect to firm-specific risk, denoted as *Vega*. The well-known claim regarding Vega is that it is positive suggesting that the manager's expected wealth is an increasing function of risk when a manager owns securities with convex payoffs, such as stock options. The benefit of a positive relationship between risk and payoffs is that it should induce managers to take necessary risks needed to increase share price. However, empirical studies find results contrary to this claim. Ackermann et al. (1999) find that "a higher incentive fee does not increase a managers' proclivity to take on risks". For most hedge funds the incentive fee is paid only if the returns surpass some hurdle rate. Thus, the incentive fee has similar characteristics to those of stock options.

Jin (2002) shows that pay for performance sensitivity is ambiguously related to firm risk.¹ Elton et al. (2003) find that incentive-fee funds do not earn positive incentive fees stating that, "Funds with incentive fees have, on average, a beta less than one. The coefficient on the incentive fee in a total risk regression is always insignificant and does not even display a consistent sign". In this study, we try to resolve the issue whether stock options encourage managers to take risk. We do this by regressing several key variables, including the value of the CEO's option grant, on future firm risk.

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¹ In Jin (2002), pay-performance sensitivity, b , is defined in the linear contract to the agent: $\pi = bS + \text{constant}$, where π is the payoff to the agent. However, they cannot determine the conditions under which the relationship between the firm's risk and manager's incentive will change. One of the limitations of Jin (2002) is that the option-pricing model is not used. As a result, an important characteristic of convexity of payoffs is ignored.

The paper starts with the analysis of an option pricing model that reflects an assumed arbitrage-free market. An arbitrage-free market implies there is a market price for risk which means that any increase in firm risk must be fully compensated for by the firm's equity returns. When this does not occur, the firm's stock price will suffer because the risky projects cannot generate enough returns to compensate for the risk taken. CEOs with option grants will need to consider market risk as they choose the level of firm specific risk needed to maximize the value of their option grants, and in turn, the firm's own stock price.

It is well known that stock option grants represent but one component of executive compensation. Other pay components include the CEO's annual salary and bonus opportunities. These additional components of pay are generally not linked to share price in their entirety and consequently these pay components may either increase or decrease the CEO's incentives to take risk. In studying the impact that stock options have on firm risk, we therefore control for these other pay components as suggested by Rajgopal, Shevlin and Zomara (2005).

We also consider how key executive characteristics might affect firm risk. Specifically, we consider whether CEO experience and power might alter the CEO's risk taking behaviors. Optimal contracting theory (Holmstrom and Milgrom, 1987; Starks, 1987) supports the view that increases in CEO tenure (a measure of CEO experience or power) cause changes in pay levels. However, the effect of CEO tenure on firm risk is less clear. It may be the case that CEOs may become less aggressive as their tenures increase. On the other hand, managers with long tenures in publicly traded firms may be more willing to "roll the dice" since they may feel that their experience will help them in managing risk.

As part of the empirical work, we derive regression estimates using fixed effects regression approaches and panel corrected error term methods. We used a fixed effects model because these have historically been used in executive compensation studies (Jin, 2002). We also consider panel corrected error methods because these methods are explicitly designed to control for the heteroscedasticity and autocorrelation which is generally present in executive compensation studies.

We tested our predictions using firm and CEO specific information obtained from Compustat's ExecuComp database. The results with respect to the fixed effects model are supportive of several of our predictions, although the overall fit of the model is poor, with an overall R^2 of less than .01. The results found with the panel corrected error model are also supportive of several of our predictions, specifically those related to the role that compensation and tenure play in determining future firm risk. Additionally, the results using panel corrected error methods suggest strongly that the error terms are autoregressive and that controlling for these error terms increases the explanatory power of the model.

The results of our paper contribute to the growing executive compensation literature in a number of ways. First, the paper provides support that current stock option grants do affect future firm risk. Second, the paper shows that changes in an executive's base salary can be used to mitigate the influence that stock option grants have on future firm risk. Finally, the paper provides insights into how CEO tenure affects future firm risk. Of particular importance to shareholders is our finding that the firm's future risk profile increases with CEO tenure,

suggesting that CEOs adopt more aggressive strategies over time. This is important since recent corporate failures, especially Enron and Worldcom, have been blamed on the executive's desire to increase firm risk regardless of how these increases might impact shareholders interests.

The next section of this paper develops the hypotheses of interest. Section III describes the sample selection process and the empirical model used in testing these hypotheses. Section IV then presents the empirical results of the paper and a discussion of these results. Finally, Section V summarizes and concludes the paper.

II. Hypotheses

The Influence of Stock Option Awards on Future Firm Risk

Consistent with past research, we expect a positive relationship between stock option grants and future firm risk, with larger option grants leading to greater levels of firm risk. We expect this result because the payoffs to stock options are generally considered convex in firm risk, with greater payoffs accruing to managers willing to take on added firm risk. Given this, managers with greater stock option grants have more to gain from increasing firm risk and so we hypothesize that future firm risk will be positively affected by current period stock option grants.

H₁: Future firm risk will be positively affected by the size of the CEO's current stock option grant.

The Influence of Market Price for Risk on Future Firm Risk

An arbitrage-free market implies the existence of market price for risk (see Musiela and Rutkowski, 1998). Intuitively, investors demand that any additional risk to firm equity be fully compensated for by the stock return:

$$g \geq \Lambda \sigma \quad (1)$$

where g is the stock return, Λ is market price for risk, and σ is the risk (volatility) of firm equity. We denote D as the dividend and assume the evolution of D follows the log normal distribution:

$$dD_u = gD_u dt + \sigma D_u dW_u \quad (2)$$

where W is the standard geometric Brownian motion. For this setting, it can be shown that the stock price follows the geometric Brownian motion, for which the stock price will exhibit the log normal distribution and be related to D through (see Appendix)

$$S_t = \frac{D_t}{h} \quad (3)$$

where $h = r - (g - \Lambda \sigma)$. Equation (3) is the stochastic version of the constant growth dividend discount model. A change in the underlying risk associated with the future dividend affects the price of the stock and, in turn, affects the option payoff in the future.

The standard measure of the incentives derived from the manager's compensation is the pay for performance sensitivity measure (see Jensen and Meckling, 1976, Haugen and Senbet, 1981, Agrawal and Mandelker, 1987; Yermack, 1995, Tufano, 1996; Carpenter, 1998, 2000; Johnson and Tien, 2000; Hall, 2000, and Hall and Murphy, 2002). Pay for performance sensitivity (Jensen and Murphy, 1990) represents the total change in the manager's wealth

resulting from a \$1,000 increase in shareholder value. As the market price for risk increases, the stock price declines creating a dampening effect on the risk-seeking behavior whenever CEO compensation includes a stock-based element. Since CEO compensation for publicly trade companies generally does include a stock-based element, be it restricted stock or option grants, we can state the following hypothesis.

H₂: Future firm risk will be negatively affected by an increase in the market price for risk.

The Influence of Salary and Annual Bonus on Firm Risk

One of the main roles of a compensation contract is to provide top managers with the financial incentives needed to improve firm performance. One aspect of the compensation contract that influences the incentive properties of stock options is the level of base salary embedded in the contract. What past research has not focused on is how changes in an executive's base salary (bonus) might affect the manager's willingness to take on added firm risk. We believe that larger base salaries would dampen the manager's willingness to take on added firm risk because base salaries are largely paid without regards to firm performance (see Milkovich and Newman 2005). Because of this, managers with higher base salaries have less of an incentive to take on the more risky projects that could lead to wind-falls in corporate profits and CEO performance-based pay. We state this later result and list this as our Hypothesis H₂.

H₃: Future firm risk will be negatively affected by the CEO's current year base salary.

Since the CEO's annual bonus is generally tied to current year performance (see Murphy, 1999), with current year performance being measured in a number of differing ways, we expect the current year bonus to be unrelated to future firm risk. We expect this for two reasons. First the annual bonus and its criterion are generally set at the beginning of the year. Consequently, we expect any incentives created by the annual bonus to cause changes in the current year results and not in future year results. Second, the criterion used in evaluating the CEO's short-term performance can differ from year to year which would limit the possibility of a direct link between firm risk and CEO annual bonuses.

H₄: Future firm risk will be unaffected by the CEO's current year annual bonus.

The Influence of Tenure on Future Firm Risk

The influence that management tenure has on the observed relationship between risk and incentives is not as clear cut. Past research by Hill and Phan (1991) suggests that the relationship between risk and short-term incentives becomes positive and significant as CEO tenure increases. In essence, Hill and Phan find that the firm-specific risk inherent in short-term compensation becomes more absorbed by the firm's shareholders and less by the CEO as the CEO's time in grade (or influence) increases. If this is indeed the case, CEOs with greater tenure should be more willing to take on more risk.

H₅: Future firm risk will increase as the CEO's tenure with the firm increases or the CEO takes on the dual role of Chairman of the board.

III. Empirical Model Specification and Sample Selection

Hypotheses 1-4 were tested using a pooled cross-sectional regression model. The dependent variable equals a measure of future firm risk and is denoted as *RISK*. The variation in the firm's own stock price performance, denoted as *RISK*, was measured as the standard deviation of the company's own stock price volatility over the succeeding 60 months, starting with the year following the current year.

The model views firm risk as a function of CEO's stock options, where *OPTIONS* equals the current year's stock options award, determined using the Black-Scholes option pricing model (see Jennergren and Naslund, 1993). Firm specific attributes known to affect firm risk and the CEO's risk aversion are also included in the set of independent variables. The firm specific attributes included in the model are current year firm sales, denoted *SALES*, and the firm's end of the year market-to-book ratio, denoted *MARKET/BOOK*. Sales numbers were included within the model as a proxy for CEO power over the compensation process. It has been argued that CEOs like to be rewarded for increasing firm size even though such actions may put the firm in a very risky position (see Jensen and Meckling, 1976; Williamson 1964).

The firm's market-to-book ratio is included in both models to control for inter-firm differences in investment opportunities (Baber et al., 1996; Gaver and Gaver, 1993; Holthausen et al. 1995; and Smith and Watts, 1992). Firms with lesser market opportunities may be less willing to roll the dice on a risky project because the number of high-yielding projects is not large and therefore any risk taken by the CEO cannot be diversified away using a menu of projects.

The equity premium, denoted as *PREMIUM*, was used as a measure of the market price for risk. In addition, two influence measures were included in the model. The first measures the executive's tenure as CEO as of the end of the current year, and is denoted as *TENURE*. Consistent with past research, *TENURE* was measured in terms of the number of years the executive had been CEO of the firm. The second measures whether the executive was Chairman and CEO or just the CEO of the company as of the end of the current year, and is denoted as *DIRECTOR*. The managerial power view of executive compensation suggests that CEOs that hold the position of both CEO and chairman of the board are able to use their titles to gain greater pay, without having to face heightened risk. Recent empirical research supports such a view by showing that CEO pay is 20-40 percent higher when the CEO is also chairman of the board (Cyert, Kang, and Kumar, 2002).

Finally, the CEO's current year annual salary and bonus, denoted as *SALARY* and *BONUS*, were also included in the model. These were included to determine how current compensation, which to some extent is and is not tied to firm performance, affects the CEO's willingness to take on added risk.

Given our descriptions of the variables and our hypotheses of interest, we structured our empirical model as follows:

$$\begin{aligned}
 RISK_{it+5} = & A + B_1OPTIONS_{it} + B_2BONUS_{it} + B_3SALARY_{it} \\
 & + B_4MKT_BOOK_{it} + B_5SALES_{it} + B_6PREMIUM_{it} \\
 & + B_7DIRECTOR_{it} + B_8TENURE_{it} + e_{it}
 \end{aligned} \tag{4}$$

where the subscripts associated with each independent variable indicate that the variables were measured for firm i at the end of year t .

Support of our hypothesis H₁ would require that B_1 be positive and statistically significant, while support of hypothesis H₂ would require that B_6 be negative and statistically significant. Support of Hypothesis H₃ would require that B_3 be negative and statistically significant and support for Hypothesis H₄ would require B_2 to be statistically insignificant. Finally, support of hypothesis H₅ would require that B_7 or B_8 be positive and significant.

The Sample

The data used to estimate the model were gathered from the ExecuComp database for the years 1992-2002. Companies without CEO tenure information were first eliminated in arriving at the final sample. This requirement reduced the available firm years from 117,733 to 24,085. Firms that were missing data from 1992 or 2002 were also excluded from the sample. This was done to assure that the sample included firms from the same time periods. This exclusion reduced the sample to 6498 firm years, with each of the 722 firms in the final sample having 9 years of data.² To have a reliable risk measure, we computed firm risk using the standard deviation of the company's own stock price for the succeeding 60 months, starting with the year following the current year. This requirement further reduces our sample size to 2,888 observations.

We used pooled-time series regression methodologies to analyze the data. Pooled-time series models are useful because they contain information necessary to analyze both the intertemporal dynamics and the individuality of the entities being investigated. We use two distinct approaches to fitting (4) to the data, adopting both a fixed effects model and a panel corrected error model, referred to as a (PCSE) model (see Beck and Katz, 1995, 1996).

IV. Sample Descriptives and Hypothesis Testing

Sample Descriptives

Table 1 reports the means and medians for the sample variables.

[Insert Table 1 here]

As shown in Table 1a, the sample firms were fairly sizable with median sales of \$0.97 billion and mean sales of \$3.8 billion. The executives at these firms were awarded on average \$0.8 million in stock options, and earned \$0.41 million in annual bonuses and \$0.45 million in salary. Finally, the average tenure for the CEOs in our sample was 4.1 years.

²In order to use PCSE models, firm specific data must be available for all years covered by the study. Because of this requirement, issues of survivorship bias will not be present with such models. This data restriction also allows the panel data to partially control for unexpected ups and downs in the dependent and independent variables by looking at firm-specific data over a protracted period.

Table 1b provides sample descriptives by year, which provides insights into the changes that occurred through the sample period. The year-to-year fluctuations and the directions of these fluctuations across variables suggests the effects of serial correlation. When serial correlation is present, the raw correlation coefficients between the independent variables can be biased and misleading. Nevertheless, we still present the correlation matrix for our independent variables in Table 2.

[Insert Table 2 here]

As shown in Table 2, the highest degree of correlation occurs between sales and CEO salary levels (a correlation coefficient of 0.43) suggesting concerns over multicollinearity. Nevertheless, we kept both variables in our regression models because the correlation matrix indicates that CEO salary and sales levels are important determinants of future firm risk. When this occurs, dropping one of the two variables from the regression model could potentially bias the estimated coefficient of the variable remaining in the model away from its true value.

Tests of Hypotheses

Table 3 reports both the fixed effect results found from fitting model (4) to the data (see Column 1 of Table 3), as well as the PCSE results found from fitting our model to the data (see Column 2 of Table 3).

[Insert Table 3 here]

Column 1 of Table 3 reports statistically insignificant coefficients for the three compensation variables (*OPTIONS*, *BONUS* and *SALARY*), a positive and statistically significant coefficient for the market risk premium variable (*PREMIUM*) and a negative and statistically significant coefficient for the CEO tenure measure (*TENURE*). The overall fit of the model, as measured by the models R^2 of less than .01, suggesting that either the fixed effects model is not well suited to the data or that there is little relationship between the independent variables and our dependent variable.

One possibility raised by past research is that the low R^2 may be reflective of heteroscedasticity and autocorrelation in the disturbance terms (Chang, 1998). PCSE methods are designed to control for these problems. Column 2 of Table 3 reports the regression results found from fitting the sample data using PCSE methods.

Column (2) indicates a positive and statistically significant coefficient for *OPTIONS*. This finding suggests that, after controlling for cross-sectional heteroskedasticity and time-wise autoregression, the CEO's stock options still have a positive effect on firm risk. This result is consistent with theory and provides support for Hypothesis H₁. Column (2) also reports a negative and statistically significant coefficient for *PREMIUM*. This suggests that the market price for risk has a negative effect on overall firm risk which is supportive of our Hypothesis H₂.

The coefficient on *SALARY* reported in Column (2) is also negative and statistically significant, while the coefficient on *BONUS* is negative but not statistically significant. The finding with regard to *SALARY* is consistent with Hypothesis H₃ and suggests that base salaries have a moderating effect on firm risk. The insignificance of the coefficient on *BONUS* suggests

that this is not the case for the bonus opportunity. This later result provides support for Hypothesis H₄ and suggests that compensation committees can use some components of a CEO's compensation package to encourage or moderate risk-taking behaviors.

Column 2 also indicates that future firm risk increases as the CEO's tenure with the firm increases and as he/she takes the dual role of chairman of the board. This supports Hypothesis H₅ and confirms the findings of Hill and Phan (1991) which suggests that firm-specific risk becomes more absorbed by the firm's shareholders and less by the CEO as the CEO's time in grade increases. Because of this, the CEO is free to take added risk without concerns about how this risk might impact his/her overall compensation. Another possible explanation of these differential effects may be linked to the so-called horizon problem that is created as the CEO gets closer to retirement age (see Brickley, Coles, and Linck, 1999)³, and becomes more concerned with his/her legacy and less so with compensation levels.

In terms of the other variables included in the model, Table 3, Column (2) indicates that future firm risk reacted in a negative and statistically significant manner as sales levels increased. These results suggest that increases in firm size are associated with lower levels of future firm risk. Such results are not surprising and are consistent with observed market data. The remaining variable included in the model, *MARKET/BOOK*, had a positive effect on firm risk. This result suggests that companies with greater current investment opportunities also tend to have higher future firm risk.

V. Summary and Conclusion

In this paper, we try to resolve why theoretical predictions of a positive relationship between CEO stock options and future firm risk have not been borne out by empirical tests of this prediction. The empirical results derived from our fixed effects model support the findings of past empirical research and provide no support for a linkage between a CEO's stock option grant and future firm risk.

The real limitation of a fixed effects model is that it is not structured to explicitly control for the heteroscedasticity and autocorrelation present in the data. These limitations motivated us to adopt PCSE methods which explicitly control for these issues. We find, using PCSE methods, that current period stock option awards do have a positive effect on future firm risk.

Consistent with the theory of option pricing, we also find that the current year's market risk premium has a statistically significant negative effect on firm risk. When coupled with the results found for stock options, we conclude that the market price for risk can have dilutive effects on the risk-seeking incentives created by the stock option grant. Compensation committees concerned about this dilution should consider making the CEO's stock option grants adjustable to the market price for risk.

We also find from the PCSE model that current year salaries are negatively related to future firm risk, but that current year bonuses do not seem to have the same type of effect. We

³ The fact that CEO age and CEO tenure are highly correlated with one another limits our ability to discount the horizon problem, and the extent to which this is driving our result with regards to tenure.

view these results, and the result found with respect to options, as suggesting the need for the compensation committees to consider all components of CEO compensation when trying to motivate executives to take risks that are in the shareholders interests. Such findings also provide certain guidelines to consider when corporate governance measures are designed. For example, the golden parachute is also a form CEO compensation that bears similarities to stock options. As such, compensation committees should consider how the golden parachute might alter a CEO's willingness to take on risk before unilaterally adopting such measures.

We also find from the PCSE model that CEOs with greater tenure and with the dual role of chairman of the board take more risks than those with shorter tenure and less board influence. We feel that these findings hold implications for boards in their designs of succession plans and in terms of the amount of board authority to bestow on the CEO.

Future work could broaden the results of this study by looking at these issues over an expanded number of years. Results from such studies would further our understanding of CEO compensation contracts, their influence on CEO actions, and how these translate into shareholder value.

Appendix

Dividend, D , follows the linear stochastic differential equation

$$dD_u = gD_u dt + \sigma D_u dW_u^* \tag{A1}$$

where g is a constant growth rate of the dividend and $g \in R$, σ is a constant volatility coefficient and $\sigma > 0$. $W_t^* : t \in [0, \infty)$ is a one-dimensional standard Brownian motion defined on a filtered probability space $\{\Omega, \{F_t; t \geq 0\}, P^*\}$ satisfying the usual conditions⁴. Assume that the market price of risk, Λ , is a progressively measurable process with value in R (Karatzas and Shreve, 1998) and satisfies

$$P \left[\int_0^T \Lambda^2 dt < \infty \right] = 1 \text{ and } E^{P^*} \left\{ \exp \left[\int_0^T \frac{\Lambda}{\sigma} dW_t^* - \frac{1}{2} \int_0^T \left(\frac{\Lambda}{\sigma} \right)^2 dt \right] \right\} = 1$$

Define a probability measure P by means of the Radon-Nikodym derivative

$$\frac{dP}{dP^*} = \exp \left(\Lambda W_t^* - \frac{1}{2} \Lambda^2 t \right)$$

The dynamics of D under P are

$$dD_u = (g - \Lambda \sigma) D_u dt + \sigma D_u dW_u \tag{A2}$$

where W_t is a standard Brownian motion under probability measure P . The stock price process S is the expected future dividend payments

$$S_t = E^P \left(\int_t^\infty D_u e^{-r(u-t)} du \mid F_t \right)$$

Applying Ito's formula and using (A2), we have

$$dS_t = (g - \Lambda \sigma) S_t dt + \sigma S_t dW_t \tag{A3}$$

The stock price at time o^+ is

$$S_{o^+} = E^P \left\{ \int_o^\infty D_u e^{\int_o^u \left((g - \Lambda \sigma) - \frac{\sigma^2}{2} \right) du + \int_o^u \sigma dW} ds \mid F_o \right\} \tag{A4}$$

and

$$S_t = \frac{D_t}{r - (g - \Lambda \sigma)} \tag{A5}$$

⁴ See Protter (1990) for the definition of usual conditions.

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Table 1a- Sample Descriptives

	RISK	OPTIONS	BONUS	SALARY	MKT/BOOK	SALES	PREMIUN	DIRECTOR	TENURE (Years)
Mean	0.373984	821.4758	408.5597	446.0337	3.132763	3770.748	12.88	0.825485	4.1
25 percentile	0.27	0	75	260	1.649495	431.0225	2.195	1	.0
Median	0.343	171.106	213.1345	387.514	2.351765	970.289	11.935	1	1.8
75 percentile	0.442	648.5185	450	562.516	3.551929	3079.987	23.565	1	8.0

$PREMIUM_{it}$ = Equity risk premium for firm i in year t (measured in percentage) - Large company stock return minus Treasury bill yield.

$SALARY_{it}$ = Base salary of firm i 's CEO in year t (measured in \$1000's).

$BONUS_{it}$ = Annual bonus of firm i 's CEO in year t (measured in \$1000's).

$RISK_{it+5}$ = Black-Scholes price volatility for firm i at time t measured as the standard deviation of the volatility of firm i 's stock price calculated over the following 60 months (5 years).

$MKT/BOOK_{it}$ = Ratio of market value and book value of firm i in year t .

$SALES_{it}$ = Firm i revenues in year t revenues (measured in \$millions).

$DIRECTOR_{it}$ = Dummy variable coded as 1 if firm i 's CEO is also Chairman of the Board in year t ; coded as 0 if the CEO is not Chairman of the Board.

$TENURE_{it}$ = Number of years- through year t - that firm i 's CEO has held that position.

$OPTIONS_{it}$ = The value of the stock options awarded to firm i 's CEO in year t (measured in thousands).

Table 1b- Sample Descriptives

YEAR	RISK	OPTIONS	BONUS	SALARY	MKT/BOOK	SALES
1993						
Mean	0.325723	441.7906	297.8766	385.1803	3.22002	3251.029
Median	0.2945	70.538	160.289	328.521	2.481833	771.1435
1994						
Mean	0.353585	688.2588	373.4743	426.3007	2.900433	3532.931
Median	0.3225	185.0265	210.9325	372.0095	2.156169	922.7435
1995						
Mean	0.395813	772.7175	429.5077	465.5041	3.090118	3995.524
Median	0.363	199.5685	233.125	402.7525	2.365577	1038.786
1996						
Mean	0.420817	1383.136	533.3803	507.1496	3.320479	4303.507
Median	0.3765	270.7915	291.45	448.9185	2.42237	1179.539
Total						
Mean	0.373984	821.4758	408.5597	446.0337	3.132763	3770.748
Median	0.343	171.106	213.1345	387.514	2.351765	970.289

Table 2- Correlation Coefficients

Significance level is reported in the brackets.

	RISK	OPTIONS	BONUS	SALARY	MARKET/BOOK	SALES	PREMIUM	DIRECTOR	TENURE
RISK	1								
	0.0407								
OPTIONS	(0.0286)	1							
	-0.0032	0.2962							
BONUS	(0.8634)	(0)	1						
	-0.101	0.1771	0.3768						
SALARY	(0)	(0)	(0)	1					
	0.0862	0.043	0.0515	-0.0169					
MARKET/BOOK	(0)	(0.0208)	(0.0057)	(0.3642)	1				
	-0.1307	0.0936	0.2069	0.4301	-0.0027				
SALES	(0)	(0)	(0)	(0)	(0.8846)	1			
	0.1591	0.0272	0.0539	0.0964	0.0193	0.0239			
PREMIUM	(0)	(0.1446)	(0.0038)	(0)	(0.2986)	(0.2)	1		
	0.0653	0.0586	0.1224	0.3018	-0.0161	-0.0307	0.0779		
DIRECTOR	(0.0004)	(0.0016)	(0)	(0)	(0.3875)	(0.0993)	(0)	1	
	0.1093	0.0319	0.0808	0.2589	0.0035	-0.0492	0.0705	0.3871	
TENURE	(0)	(0.0865)	(0)	(0)	(0.8488)	(0.0082)	(0.0002)	(0)	1

Variable Definitions:

$PREMIUM_{it}$ = Equity risk premium for firm i in year t (measured in percentage) - Large company stock return minus Treasury bill yield.

$SALARY_{it}$ = Base salary of firm i 's CEO in year t (measured in \$1000's).

$BONUS_{it}$ = Annual bonus of firm i 's CEO in year t (measured in \$1000's).

$RISK_{it+s}$ = Black-Scholes price volatility for firm i at time t measured as the standard deviation of the volatility of firm i 's stock price calculated over the following 60 months (5 years).

$MKT/BOOK_{it}$ = Ratio of market value and book value of firm i in year t .

$SALES_{it}$ = Firm i revenues in year t (measured in \$millions).

$DIRECTOR_{it}$ = Dummy variable coded as 1 if firm i 's CEO is also Chairman of the Board in year t , coded as 0 if the CEO is not Chairman of the Board.

$TENURE_{it}$ = Number of years- through year t - that firm i 's CEO has held that position.

$OPTIONS_{it}$ = The value of the stock options awarded to firm i 's CEO in year t (measured in thousands).

Table 3- Fixed-Effects and PCSE Regression Results

Model

$$\begin{aligned}
 RISK_{it+5} = & A + B_1OPTIONS_{it} + B_2BONUS_{it} + B_3SALARY_{it} \\
 & + B_4MKT/BOOK_{it} + B_5SALES_{it} + B_6PREMIUM_{it} \\
 & + B_7DIRECTOR_{it} + B_8TENURE_{it} \\
 & + FirmDummies + YearDummies + e_{it}
 \end{aligned}$$

Independent Variable	Beta Coefficients	
	Fixed-Effects Regression	PCSE Regression
OPTIONS	2.52E-07	1.56E-06***
BONUS	-3.84E-07	-2.91E-06
SALARY	-3.71E-06	-.00007***
MARKET/BOOK	0.00005559**	.0015941***
SALES	4.68E-07	-8.75E-07***
PREMIUM	0.00057***	-.00224616***
DIRECTOR	0.0005466	.0171312***
TENURE	-2.2E-05***	5.74E-06***
Statistics		
F/Wald statistics	29.31***	720.22***
Overall R2	0.0077	.1137
Sample size	2888	2888

***Significant at the less than .01 level one tail if the sign was predicted, two tails otherwise;

** Significant at the less than .05 level (but greater than the .01 level) one tail if the sign was predicted, two tails otherwise;

Variable Definitions:

PREMIUM_{it} = Equity risk premium for firm *i* in year *t* (measured in percentage)- Large company stock return minus Treasury bill yield.

SALARY_{it} = Base salary of firm *i*'s CEO in year *t* (measured in \$1000's).

BONUS_{it} = Annual bonus of firm *i*'s CEO in year *t* (measured in \$1000's).

RISK_{it+5} = Black-Scholes price volatility for firm *i* at time *t* measured as the standard deviation of the volatility of firm *i*'s stock price calculated over the following 60 months (5 years).

MKT/BOOK_{it} = Ratio of market value and book value of firm *i* in year *t*.

SALES_{it} = Firm *i* revenues in year *t* revenues (measured in \$millions).

DIRECTOR_{it} = Dummy variable coded as 1 if firm *i*'s CEO is also Chairman of the Board in year *t*; coded as 0 if the CEO is not Chairman of the Board.

TENURE_{it} = Number of years- through year *t*- that firm *i*'s CEO has held that position .

OPTIONS_{it} = The value of the stock options awarded to firm *i*'s CEO in year *t* (measured in thousands).