Risk Aversion and CEO Selection

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Abstract

This paper studies the relationship between risk aversion and CEO selection process. In making CEO hiring decisions, companies rely on candidates' past performance to infer their ability. Candidates' risk aversion affects their past project choice and thereby their probability of being hired as CEO. I show this implies that CEO are less risk averse than other top executives, and CEO hired from outside the company are less risk averse than CEO hired from within the company. To test these predictions empirically, I use investment return volatility of executive deferred compensation account as a proxy for risk-aversion. I find after controlling for other variables, CEO's personal investment return is 12% more volatile than other top executives and outside CEO's investment return is 15% more volatile than inside ones. I also find firms run by outside CEO have higher stock price volatility, invest more in R&D and have higher leverage ratio.

Keywords: Risk Aversion, CEO Selection

JEL Classification Codes: G3, M5

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1 Introduction

This paper studies the relationship between risk aversion and CEO hiring process. I build a theoretical model where board of directors would like to hire the candidate with the highest ability, which is difficult to observe directly and has to be inferred from candidate's past performance. Because less risk-averse individuals tend to choose more risky projects with higher expected returns and higher variance, they are more likely to achieve exceptionally good performance thereby more likely to be hired as CEO. The CEO selection process gives more risky candidates an advantage in becoming CEO and this implies CEO on average are less risk-averse than other top executives.

The advantage for less risk-averse candidates in CEO hiring process also has implication concerning decision to hire from inside or outside the company. Besides past performance, board of directors can infer inside candidates' ability from various other sources of information, such as talking to their subordinates, directly observe their actions in leadership role etc. Therefore, past performance carries less weight in its assessment of inside candidates' ability. Since relying on past performance favors less risk averse individuals, this implies CEO hired from within a company tends to be more risk-averse than outside ones.

There have been very few prior empirical studies on risk aversion of CEO and other senior executives, mainly due to the difficulty of obtaining data measuring individual's risk aversion. I utilizes a new source of data to construct a proxy for top executives' risk aversion. Since 2006, SEC requires companies to disclose more information about executives' deferred compensation account (DCAs), in particular, its size and investment earnings in current fiscal year. I use these information to calculate the investment returns of executives' deferred compensation account. In most cases, executives have a wide range of investment options, the riskiness of DCA portfolio is a good measurement for risk aversion. I define ex-post riskiness as the absolute value of the difference between realized returns and risk-free rate. Using data from ExecuComp 2006-2009, I find that the portfolios of CEO are 12% more risky than other top executives which is approximately equivalent to the effects of 14 or more years reduction in age. I also find that the portfolios of outside CEO are 15 % more risky than inside CEO. These results confirm the predictions of theoretical model.

Another way to measure inside and outside CEO's risk aversion is to compare company performance variability. Using the same methodology as in Adams, Almeida and Ferreira (2005), I test stock price volatility and performance variance within company over time. For the period between 2004-2009, I find stock prices are 7% more volatile for companies run by outside CEO. Moreover, this result is unlikely to be caused by endogeneity and omitted variable problem, that is to say risky firms tend to hire from outside the company. And if outside CEO's risk aversion are not different from those of inside CEO, we would expect outside CEO to choose more conservative personal investment portfolio to counter higher income uncertainty. But this is contradicted by the regression result of riskiness of DCAs. Therefore higher volatility of company performance and higher riskiness of personal investment for outside CEO combined together give strong support to the hypothesis that outside CEO are less risk-averse.

Finally I study the relationship between CEO origin and the company's corporate strategy. I find that companies run by outside CEO invest more in R&D and have higher financial leverage ratio. Both of these are usually associated with more risky corporate behavior. This suggests CEO's risk preference play an important role in setting corporate strategy. Combining all of these results, the empirical evidence overwhelmingly show that outside CEO are less risk averse compared to inside ones. This also shows that difference in CEO risk aversion lead to different corporate strategy and different firm performance variability. The interrelationship between risk aversion and CEO hiring decision have real effects on company performance.

This paper is related to several strands of literature. First, several papers (Skaperdas and Gan(1995), Bognanno(2001), Cornes and Hartley(2003) and Gilpatric(2009)) on tournament competition study the relationship between risk aversion and promotion probability. The main difference between this strand of work and my model is that they treat selection of CEO as an incentive mechanism motivating senior executives to work harder. Companies are not concerned with hiring the candidate with the highest ability, while in my model, companies are only interested in hiring the candidate with the highest ability and incentive issues are excluded. Also tournament competition models cannot be used to study the relationship between CEO origin and their risk aversion. Furthermore, these papers only explore the issue theoretically. In my knowledge, this is first empirical work studying the relationship between risk aversion and probability of becoming CEO.

There are a large amount of studies in management literature on inside\outside CEO hiring, for example Zajac(1990), Datta and Guthrie (1998). There are also a large amount of studies about post-succession firm performance. However, there have been no previous studies linking risk aversion with inside\outside CEO hiring either theoretically or empirically. Also previous literature mainly concentrate on comparing the mean of company performances, there are almost no studies on relationship between inside\outside CEO hiring and firm performance variability and corporate strategy. In finance literature, Borokhovich, Parrino and Trapani (1996) finds a strong positive relation between the percentage of outside directors and the frequency of outside CEO succession. Murphy (2003) and Hermalin (2005) study causes for the recent trend in hiring more outside CEOs.

Thirdly, this paper is related to the literature started with Bertrand and Schoar (2003) that study the relationship between CEO characteristics and corporate strategy. There have also been only a small number of studies on firm-level performance variability. This paper complements this literature. (Campbell, Lettau, Malkiel, and Xu (2001); Adams, Almeida, and Ferreira (2005); Cheng(2008)).

The rest of the paper proceeds as follows: Section 2 sets up the theoretical model and derives results about risk aversion and CEO selection. Section 3 describes the data. Section 4 presents the analysis comparing CEO and other top executives' risk aversion. Section 5 presents the analysis on the relationship of inside\outside CEO and risk aversion. Section 6 concludes.

2 Model

2.1 Settings of the Model

A firm hires a CEO for next period from a candidate pool of N individuals. The pool contains managers both within or outside the company. Each individual is characterized by parameters (a, γ), where a denotes the individual's ability, and γ her risk preference. I assume a and γ are independently distributed. $a \sim N(0, \sigma_A^2)$ and $\gamma \in \{\gamma_H, \gamma_L\}, \gamma_H > \gamma_L$, $P(\gamma = \gamma_H) = p$. Individuals with risk preference γ_H are less risk-averse than individuals with γ_L. The firm cannot observe candidates'risk preference γ.

Each individual undertakes a project in current period. I assume there are 2 types of projects: high-risk (μ_H, σ_H^2) and low-risk (μ_L, σ_L^2), $\sigma_H^2 > \sigma_L^2$. If an individual with ability a chooses project $i, i \in (L, H)$, the project outcome x is normally distributed, $x \sim N(a + \mu_i, \sigma_i^2)$. I assume individuals with risk preference γ_H (low risk aversion) will choose the high-risk project (μ_H, σ_H^2), and individuals who are more risk-averse $\gamma = \gamma_L$ will choose project (μ_L, σ_L^2). Since $\sigma_H > \sigma_L$, to induce γ_H type to choose high risk project, I assume $\mu_H > \mu_L$.

The firm wants to hire the individual with the highest ability a. I assume

a cannot be directly observed (this will be relaxed in section 2.2). After observing project outcome of each candidate, the firm uses Bayes' Rule to form posterior belief of each candidate's ability. The firm is risk-neutral, so it will hire the individual with the highest posterior expected ability.

2.2 Relationship between risk preference and hiring

In this subsection, I assume the only information the firm has concerning the individual's ability is project outcome x. The firm's prior belief of each candidate's ability is $a \sim N(0, \sigma_a^2)$. Proposition 1 shows that the firm's optimal decision is to hire the individual with the best project outcome.

Proposition 1 *The firm will hire the individual with the highest project outcome x.*

Proof Given x, the posterior distribution of ability a is

$$f(a|x) \propto p\phi(\frac{x - \mu_H - a}{\sigma_H}) + (1-p)\phi(\frac{x - \mu_L - a}{\sigma_L}) \tag{1}$$

where $\phi(.)$ is the normal probability density function.

From this,

$$P(a \geqslant a_0|x) \propto \frac{p}{\sigma_H}\Phi(\frac{x - \mu_H - a_0}{\sigma_H}) + \frac{1-p}{\sigma_L}\Phi(\frac{x - \mu_L - a_0}{\sigma_L}) \tag{2}$$

where $\Phi(.)$ is the normal cumulative distribution function.

If $x_1 > x_2$, from (2), $a|x_1$ first order stochastically dominates $a|x_2$. The firm chooses individual with $x = x_1$. ∎

Proposition 1 says because higher project outcome is associated with higher ability, the firm should always hire the individual with the highest project outcome x.

Next I study the effects of risk-aversion on the probability of being hired as CEO. To simplify the problem, first I assume the candidate pool is fixed.

Then I generalize the result to the case where candidate pool is drawn randomly and follows a Binomial distribution.

Lemma 1 *Suppose of the N candidates, N_H candidates are of risk preference γ_H, N_L are of risk preference γ_L. $N_H \geqslant 1, N_L \geqslant 1, N_H + N_L = N$. Then P (Type γ_H is hired as CEO)$> \frac{N_H}{N}$*

Proof The proof is in the Appendix. ∎

Because candidate risk preference and ability are independently distributed, if probability of being hired as CEO is not related to risk preference type, the probability of less risk averse individuals being hired should equal their population proportion, i.e. P (Type γ_H is hired as CEO)$= \frac{N_H}{N}$. Therefore, Lemma 1 says that less risk averse individuals' chances to be hired as CEO are higher than their population proportion, which is to say, they are more likely to be hired as CEO. The intuition behind Lemma 1 is that more risky candidates choose projects with high expected return and high variance. From Proposition 1, the firm will hire the individual with the best project outcome. High expected return obviously increases the candidate's probability of achieving the best performance. High variance means their project outcomes are more likely to be exceptionally good or exceptionally poor. When there are only two candidates ($N = 2$), the net effect of variance on probability of being hired as CEO is zero. When $N > 2$, the best performance of all other candidates is not symmetrically distributed. The probability of it being very low becomes very small. So the moving the probability mass from achieving poor performance to very poor performance matters little for the chance to be hired as CEO, while increasing the probability of achieving exceptionally good performance clearly helps. Hence, the net effect of high variance is to increase the individual's probability of becoming CEO when $N > 2$. Combining the effects for high expected return and high variance, we have P (Type γ_H is hired as CEO)$> \frac{N_H}{N}$. Less risk averse individuals are more likely to be hired as CEO.

To extend Lemma 1 to the case where candidate pool is drawn randomly, just notice N_H is a binomial distribution with parameter (p, N). It is very easy to show

Proposition 2 *P (Type γ_H is hired as CEO)> p*

Proof The proof is in the Appendix. ∎

I do not explicitly model the individual's compensation structure and utility function. Her payoff is likely to consist of 2 parts: current and future compensation. Current compensation is likely to be positively linked to project outcome. An increase in project risk leading to more uncertainty in current income, will cause disutility especially for more risk averse types. For future compensation, Proposition 1 shows high risk project can increase the probability of becoming CEO which will lead to higher compensation, but it also increases probability of extremely poor project outcomes which may lead to the candidate being fired from current position. The disutility from increasing risk is also higher for more risk averse types. Therefore more risk averse candidates would stick to low expected return, low variance projects, even if this means that they are less likely to become CEO.

For empirical implication, Proposition 2 says the probability of CEO is of low risk aversion type is higher than its prevalence in the candidate pool. Because the candidate pool to recruit CEO mainly consists of senior executives within and outside of the company, Theorem 1 implies that CEO are on average less risk averse than other senior executives. I will test this hypothesis in Section 4.

2.3 Risk Aversion and CEO Origin

In reality, companies have other sources of information concerning candidates' ability besides prior performance, especially if the individual is currently employed by the firm. For inside candidates, these other sources of information plays a more important role in firm's assessment of their ability, and project outcome x carries less weight. Hence for inside candidates, less risk-averse individuals' advantage in becoming CEO becomes smaller. To model this, I assume the firm may directly observe the candidate's ability from other sources. And the probability of this happening is higher for inside candidates than outside candidates. I modify the model in 2.1 to study how this affects the firm's hiring decision.

Suppose there are 2 types of candidates: inside and outside. The candidate i's inside\outside type is denoted as T_i. P(T_i=inside)=p_I, P(T_i=outside)= $1 - p_I$. Inside\outside type T_i is independently distributed from ability a_i and risk preference type γ_i. With probability q_i, the firm can directly observe the individual's ability a, and $i \in \{I, O\}$, where q_I denotes the probability for inside candidates, q_O denotes the probability for outside candidates, and I assume $q_I > q_O$. So the firm is more likely to observe inside candidates' ability than outside ones. If the firm cannot directly observe the candidate's ability, it uses project outcome x to infer her ability the same way as described in section 2.1. As before, I assume the firm to be risk neutral and will hire the individual with the highest posterior mean ability.

If the firm cannot directly observe the candidate's ability, given project outcome x, the posterior mean of her ability is

$$E(a|x) = p\frac{x - \mu_H}{1 + \frac{\sigma_H^2}{\sigma_A^2}} + (1-p)\frac{x - \mu_L}{1 + \frac{\sigma_L^2}{\sigma_A^2}} = \alpha * x + \beta \tag{3}$$

,where $\alpha = p\frac{\sigma_A^2}{\sigma_A^2+\sigma_H^2} + (1-p)\frac{\sigma_A^2}{\sigma_A^2+\sigma_L^2}$ and $\beta = -\mu_H\frac{\sigma_A^2}{\sigma_A^2+\sigma_H^2} - \mu_L\frac{\sigma_A^2}{\sigma_A^2+\sigma_L^2}$.

Similar to the case in Proposition 1, posterior mean ability $E(a|x)$ is increasing in project outcome x. If the firm chooses to hire from the group of individuals that it cannot directly observe ability and have to infer it from candidate's past performance, it will choose the candidate with the best project outcome x.

All candidates can be divided into 2 groups, those the firm can directly observe their ability (I call them group 1) and those the firm cannot and have to use past performance to infer it (I call them group 2). Suppose of all N candidates, M of them belong to group 1 and the other $N-M$ belong to group 2. To analyze the firm's hiring decision, I divide it into 3 steps. First, for candidates in group 1, project outcome plays no role, the firm just find the individual with the highest ability. Next for candidates in group 2, the firm choose the candidate with the best project outcome and use equation (3) to calculate her posterior mean ability. Finally, the firm compare the ability of the best candidate in group 1 with the posterior mean ability of the best performing candidate in group 2 and makes the hiring decision.

Of group 1, since risk preference is independently distributed from ability, of risk preference types have equal chance of becoming the best candidate in that group. Of group 2, Proposition 2 still applies, less risk averse type is more likely to become the best performing candidate. Therefore, overall, type γ_H is still more likely to be hired as CEO. So we have Proposition 3.

Proposition 3 *P (Type γ_H is hired as CEO)$>p$*

Proof The proof is in the Appendix.

The empirical implication of Proposition 3 is the same as Proposition 2. Less risk-averse individuals in the candidate pool are more likely to be hired as CEO. We would expect CEO to be on average less risk-averse than other senior executives.

Conditional on CEO is hired from group 1, since ability is independently distributed from risk preference, the probability of type γ_H is hired as CEO should be equal to its population proportion p. If CEO is hired from group 2, then the probability of type γ_H is hired as CEO should be greater than p. Because inside candidates are more likely to fall into group 1, the average

CEO hired from within the company should on average be more risk averse than outside CEO. We have Proposition 4.

Proposition 4 *P(Type γ_H is hired as CEO|Inside candidate is hired)*
$<$ *P(Type γ_H is hired as CEO|Outside candidate is hired)*

Proof The proof is in the Appendix

From Proposition 4, we should observe outside CEO to be less risk averse. And because firm strategy and performance is likely to be affected by CEO risk preference, we should also observe companies run by outside CEO to have more volatile performance and tend to pursue more risky corporate strategy. I will test these empirical implications in Section 3.

3 Measuring Senior Executives' Risk Aversion and Data Description

Because it is very difficult to obtain risk-aversion data, there have been very few empirical work on senior executives' risk aversion. In this paper, I utilize a new source of data on executive deferred compensation account to proxy top executives' risk aversion. In July 2006, Security and Exchange Commission voted to expand disclosure requirements regarding executive compensation. For deferred compensation, the new regulations require companies to disclose information on deferred compensation account including executive contributions, company contributions, withdrawals, all earnings for the year (not just the above-market or preferential portion) and the year-end balance. These information are collected in ExecuComp database for year 2006-2009. Using these information, I can calculate investment return in executives' deferred compensation account. Before proceeding to the calculation method, I first briefly describe deferred compensation account.

3.1 Deferred Compensation Account

For tax purposes, most companies offer their top executives the opportunity to defer part or all of their cash compensation to the future. Similar to 401(k), many firms also match executives' contribution by certain formulas. In most companies, executives have a wide variety of choices to invest their deferred income. For example, Boeing executives can invest in interest bearing account, Boeing Stock or 17 other different mutual funds. Usually executives can change their fund allocation at any time, but there are restrictions on executives trading on the company's own stocks. Deferred compensation accounts are usually withdrawn when the individual retires or quits the company. Unlike 401(k) accounts, they are mostly notional and unfunded.

As in standard investment theory, senior executives' investment portfolio choice is determined by their risk preference. Less risk averse individuals would choose high risk portfolios which have higher expected returns but also higher volatility. Because senior executives are highly successful, financially sophisticated and with many resources for personal finance advice, their portfolio choice should clearly reflect their underlying risk preference. In cases where companies offer a wide range of choices for deferred compensation account investment, volatility of their investment portfolio is a good proxy for their underlying risk preference. Because I do not have data on their portfolio choice, I cannot calculate their portfolio's ex ante riskiness. I use their investment portfolio ex post return volatility instead.

3.2 Calculation of Investment Return and Ex Post Volatility

ExecuComp dataset contains executive deferred compensation data for S&P 1500 companies for the period 2006-2009. I use 5 data items to calculate the approximate investment returns: contribution by the company (CC), contribution by the executive (CE), aggregate earnings for the account (E), aggregate withdraw from the account (W), and aggregate balance at the end of the fiscal year (B). Assuming the withdraw happens at the end of fiscal year, and contributions by the company and individual are evenly distributed over the year, the investment return can be approximated as

$$r = \frac{E}{B + W - E - 0.5 * (CC + CE)}$$

Using 1-year US treasury bill interest rates during the fiscal year as the risk-free rate i, I measure the ex post portfolio riskiness as the absolute value of the difference between r and i.

$$v = |r - i| \tag{4}$$

Therefore, if the executive's investment portfolio shows very high or very low(negative) returns, by (4) I regard the portfolio to be of high volatility. Because the dates of the executive and company contribution to the account are not disclosed in proxy statements, r is only an approximation of the real return. If the balance of deferred compensation account from previous year is large, the approximation error is likely to be small. However, when previous balance is very low, for example when the individual first opens the account, previous balance is 0, the approximation error can be large. Therefore, for this study I exclude all data where previous balance is zero. About 2% of the data are excluded for this reason.

Some companies restrict executives' investment choices to bonds or the companies' own stock. In these cases, the returns in deferred compensation accounts do not reflect the individual's risk aversion, and these data are also excluded. I collect data on executives' investment options from companies' proxy statements. 19% of the data are excluded for this reason. In some cases, there are several accounts for the same individual in the same year. I merge these accounts and calculate a single investment return for that particular year.

3.3 Description of the Data

In total, I have data for 1136 companies between 2006 and 2009 for 7348 individuals and 15458 individual-year observations. A summary of deferred compensation data and other executive characteristics is listed in Table 1.

From Table 1, compared to other senior executives, CEO are older, more likely to be male, have higher compensation and incentive compensation including stock, option consists of a larger portion of their compensation. Also, the average deferred compensation account has more than 2 million dollars. Executives are likely to put in adequate efforts and thoughts on their portfolio choices and return volatility of deferred compensation accounts are likely to reflect their underlying risk preference.

4 Relationship Between CEO Dummy and Risk Aversion

In this section, I directly test the empirical implication of Proposition 2, comparing risk aversion levels between CEO and other top executives. For risk aversion, I use executive's investment return volatility in deferred compensation account as a proxy as described in section 3.

I regress v, investment return volatility on CEO dummy and a set of other variables. The control variables I use are age, gender, whether the executive is CFO, total compensation, ratio of value of option compensation to total compensation, ratio of company stock holding to total compensation, year dummies and industry dummies for which I use the first 2 digits of the firm's SIC code. As people come nearer to their retirement, they become more conservative in their investment decisions. Women are usually considered more risk-averse than men (more discussion below). So I include age and gender into the regression. The executive's compensation structure may also affect her investment choice. If total compensation consists of a greater percentage of equity, there is more uncertainty for current income, the executive may opt for safer investment choices. Therefore, I include Option Compensation\Total Compensation and Stock Holdings\Total Compensation as control variables. Because executives investment behavior may also be affected by firm specific factors, I also estimate year-firm fixed-effect model.

An important variable which can affect executives' investment choice but I do not have data is personal wealth. Effects of personal wealth on executive's portfolio choice depends on their utility function. If the executive's utility function is CRRA (as is usually accepted in asset pricing literature), composition of investment portfolio does not depend on personal wealth. Realized returns and portfolio riskiness is unaffected by omission of wealth and there is no estimation bias from this source. If the utility function is of increasing relative risk aversion, because CEO are likely to have greater personal wealth than other senior executives, omission of wealth will cause downward bias for the coefficient of CEO dummy, which does not affect our interpretation of the result if we find the coefficient to be positive and statistically significant. In the case of DRRA, I use current total compensation as a proxy for wealth. If we consider personal wealth as the individual's lifetime discounted permanent income, because CEO are more likely to be in their highest earning years in the sample, using current compensation as proxy for wealth overstate CEO's wealth thereby causing downward bias for CEO dummy coefficient estimate. This downward bias does not affect our interpretation of the regression result if we find the estimate to be positive and statistically significant.

In total I run four regressions, with and without current compensation with year and industry dummy, and with and without current compensation for year-firm fixed effect models. The regression results are presented in Table 2. For all 4 specifications, the "CEO" coefficients are statistically significant. CEO are less risk averse than other top senior executives. This confirms the prediction of the model. The results are also economically significant. The mean investment volatility for the whole sample is 0.12. CEOs' investment portfolio volatility is 12% higher than other senior executives, which is equivalent to the effects of 10 years decrease in age.

The regression results also show the coefficient of current total compensation is not statistically significant. This suggests for the sub-population of senior executives, their utility functions are more likely to be of CRRA form. Additionally, the regression results show that compensation structure does not affect CEO's investment portfolio choice. A likely explanation for this is that compensation structure is determined endogeneously. The contracts of less risk-averse executives are likely to contain a higher portion of equity and option compensation. Therefore, simple regression may show there is no relationship between executive's investment portfolio choice and compensation structure.

Adams, Almeida and Ferreira (2005) finds that companies with founders as CEO have more volatile performances. They interpret their result suggesting powerful CEO controlling decision making process lead to higher performance volatility. However, another interpretation of their results is that people choosing to found their own companies are less risk-averse than the general population. Thus companies run by founders have more volatile performance. However if that is the case, the results in Table II may only reflect the risk preference difference between founders and other top executives. The selection model described in Section 2.1 may not be the cause of the regression results.

To rule out this possibility, I redo the regressions by excluding companies with founder as CEO. I collect the data on whether the CEO is founder from the biography in Corporate Yellowbook and the internet, using the same definition as in Adams, Almeida and Ferreira (2005). After excluding companies run by founders, I am left with 1032 companies, 7658 individuals and 13952 individual-year observations. The regression result is presented in Table III. There is very little change in results. This suggests the finding that CEO are less risk averse than other executives is not caused by the founder factor.

5 Risk Aversion and Outside Hiring

5.1 Risk Aversion and CEO Origin

In this section, I test the empirical implication of Proposition 4. I compare risk aversion of CEO hired from within and outside the companies. I also compare their firm performance variability and study the differences in corporate strategy regarding risk.

As in Section 4, I use ex post riskiness deferred compensation account portfolio as proxy for risk aversion. The data is from EXECuComp for the time-period 2006-2009. I follow the same rule as in Section 4 to exclude some observations. I define dummy variable CEO=outside to be 1, if the person becomes CEO within 1 year of joining the company. This information is collected from CEO biographies in Corporate Yellow Book and internet. I do not exclude data for founders in this case, because founders are always defined as hired from inside. If founders are less risk-averse than other CEO, including them does not affect the qualitative conclusion of the result. The data set in total includes 938 companies and 3088 CEO-year observation. Summary statistics are listed in Table IV. Table IV shows CEO hired from outside the company have lower deferred compensation balance, lower holdings of the company stock due to their shorter tenure. They are also more likely to work for smaller companies, but their total compensation is similar to the level of inside CEO.

Similar to Section 4, I regress v, on CEO=Outside dummy and a set of controls. As discussed before, I include age, gender, compensation structure, year and industry dummies as control variables. And to control for the effects of personal wealth, I run regressions with and without current total compensation as control variables. As mentioned in Section 3, investment return r is only an approximation. Because deferred compensation balance is lower for outside CEO, the approximation error is larger. This may cause overestimation of investment return volatility for outside CEO and thus bias the result. To control for this, I include aggregate balance at the end of year into the regression. Because firms hiring inside or outside CEO may be fundamentally different, I also include firm financial data: Sale, ROA and Market-to-Book Ratio as control variables. The regression result is presented in Table V.

Table V shows CEO hired from outside the company on average choose more volatile investment portfolio for their deferred compensation account. The coefficient is significant both economically and statistically. Compared to inside CEO, outside CEO choose portfolio 15% more volatile as measure by (4). This is equivalent to the same effect of a decrease of 20 years of age. This supports the result in Section 2.2 that outside CEO on average tend to be less risk-averse.

5.2 Outside CEO and Variability of Firm Performance

Another way to measure CEO risk aversion is to compare the variability of companies run by inside and outside CEO. We would expect less risk-averse executives adopt more risky business strategies, thereby causing company performance to be more volatile.

I use the same methodology as in Adams, Almeida and Ferreira (2005). I use monthly stock return (SR) to measure firm performance and conduct

Glejser's (1969) heteroskedasticity test. Monthly stock return SR is modeled to be determined by a single explaining factor: value weighted market return (MR), and

$$SR_{it} = \beta_i MR_t + u_{it}$$

Data for SR_{it} and MR_t are from CRSP and are used to estimate βs and residuals.

For the sample, I use the same set of firms as in Section 5.1. To increase sample size, I increase the sample period to 2004-2009. Most of the CEO in service in 2004-2005 are already included in 2006-2009 sample. By extending the time period, I only add 23 CEO into the sample, but it increases the power of statistical test and I can better link the observed firm performance variability to outside CEO's lower risk aversion level. There are in total 66802 firm-month observations.

To conduct Glejser Test, I first regress MR_t on SR_{it} to obtain the residual u_{it}. Then I regress the absolute value of residual $|u_{it}|$ on CEO=outside dummy and the same set of control variables (except aggregate deferred compensation account balance) in Section 5.1. The result of the regression is shown in Table VI.

Table VI shows for all specifications, the performance of firms run by outside CEO are more variable than the ones run by inside CEO. The economic significance of the dummy CEO=outside is also large. The change from CEO=outside to CEO=inside decreases the absolute value of the residual by 17%. This is equivalent to the same effects of doubling the size of the firm.

The above heteroskedasticity test compares variation in performance both between and within a firm. As suggested in Hermalin(2005), because boards of directors have less information concerning abilities of outside candidates than inside ones, the abilities of outside CEO are more variable. Therefore, the Glejser test may capture only the variability in ability but not the effect of CEO's risk aversion on performance. I need to further test whether outside CEO increase within-firm performance variation.

I measure within-firm performance variation by the standard deviation of a firm's monthly stock returns in one year. Then I regress the standard deviation on dummy CEO=outside and the same set of control variables. The result is presented in Table VII.

The results in Table VII is very similar to Table VI. The coefficient of CEO=outside is positive and significant both economically and statistically for all specifications. This suggests higher performance variability of companies run by outside CEO is not mainly caused by greater variability in ability level. A large part of it should also be attributed to outside CEO being less risk averse.

However, there may be endogeneity and omitted variable issues with interpretation of results of table VI and VII. More risky companies may be more inclined to hire their CEO from outside. But if that is the case, outside CEO have higher current and future income uncertainty and we should expect they would invest in safer portfolio for their personal wealth to counteract these risks, which is contradicted by the opposite result in Table V. Therefore combining the results in Table V and VI, VII, the evidence show overwhelmingly that outside CEO are on average less risk averse and their preference for risk lead to greater performance variability for their companies.

5.3 Outside CEO Hiring and Company Strategy

Finally I study how outside CEO and their risk preference affect particular corporate strategies. I concentrate on 2 particular aspects: R&D investment and leverage ratio. It is usually argued that CEO with low risk aversion tend to choose higher R&D investment levels and leverage ratios (For example, (Chan, Lakonishok, and Sougiannis, (2001) and Coles, Daniel, and Naveen, (2006)). Therefore we would expect CEO hired from outside the company to choose higher R&D investment levels and leverage ratios. To test this, I regress companies' R&D ratio and book leverage ratio on CEO=outside dummy and the same set of controls as in Section 5.2. For the sample, I also use the same set of firms and time period as in 5.2. The definition for R&D ratio and book leverage ratio are listed in the appendix and data are from CompuStat. The regression results are presented in Table VIII and Table IX.

Results in Table VIII and Table IX show firms run by outside CEO invest more in R&D and have higher leverage ratios. The average R&D expenditure ratio for the sample is 0.173 while average leverage ratio is 0.31. Therefore Companies run by CEO hired from outside have 30% higher R&D investment ratio, and 3% higher book leverage ratio. The results are both statistically and economically significant. These results suggest companies run by outside CEO adopt more risky corporate strategies. Given the results in previous 2 subsection, this is most likely due to lower risk aversion of their CEO.

6 Conclusion

This paper studies CEO hiring process and its relationship with candidates' risk aversion. I find less risk-averse candidates are more likely to be hired as CEO, thereby CEO tend to be less risk-averse than other senior executives. I also find that CEO hired from outside the companies are less risk-averse on average. Using investment return volatility of executive deferred compensation account as proxy for risk aversion, I directly test these predictions and find they are strongly supported by the data. I also find companies run by outside CEO have more volatile performance. These companies also invest more heavily in R&D and have higher leverage ratio. These results suggest due to the low risk-aversion of outside CEO, these companies pursue more risky corporate strategies thereby have more volatile performance. The advantages enjoyed by less risk-averse candidates identified in the paper have important real-world effects on company strategies and performances.

A Proofs of Lemmas and Propositions

A.1 Proof of Lemma 1

Proof Suppose the cdf and pdf of random variable x is $F(x)$ and $f(x)$. Then for n independent x, the cdf and pdf of the maxima is $[F(x)]^n$ and $nf(x)[F(x)]^{n-1}$.

The distribution of γ_H type's project outcome is $N(0, \sigma_A^2 + \sigma_H^2)$, of γ_L type $N(0, \sigma_A^2 + \sigma_L^2)$. The probability candidate of risk preference γ_H being hired is:

P (Type γ_H is hired as CEO)

$= \int [\Phi(\frac{x-\mu_L}{\sqrt{\sigma_L^2+\sigma_A^2}})]^{N_L} * N_H * [\Phi(\frac{x-\mu_H}{\sqrt{\sigma_H^2+\sigma_A^2}})]^{N_H-1} * \frac{1}{\sqrt{\sigma_H^2+\sigma_A^2}}\phi(\frac{x-\mu_H}{\sqrt{\sigma_H^2+\sigma_A^2}})dx$

$= \int [\Phi(tx + \frac{\mu_H-\mu_L}{\sqrt{\sigma_L^2+\sigma_A^2}})]^{N_L} * N_H * [\Phi(x)]^{N_H-1}\phi(x)dx$

The second equality follows from change of variable and $t = \frac{\sqrt{\sigma_H^2+\sigma_A^2}}{\sqrt{\sigma_L^2+\sigma_A^2}} > 1$.

Because $\mu_H > \mu_L$,

P (Type γ_H is hired as CEO)$> \int [\Phi(tx)]^{N_L} * N_H * [\Phi(x)]^{N_H-1}\phi(x)dx = K(t)$

Differentiate it with respect to t, we get

$$K'(t) = \int x * \phi(tx)[\Phi(tx)]^{N_L-1} * N_H * [\Phi(x)]^{N_H-1}\phi(x)dx \geqslant 0 \qquad (5)$$

The inequality turns to equality if and only if $N_H = N_L = 1$, otherwise the inequality is strict. (5) holds because $x\phi(tx)\phi(x)$ is odd but $[\Phi(tx)]^{N_L-1} * [\Phi(x)]^{N_H-1}$ is positive and increasing in x.

Therefore,

P (Type γ_H is hired as CEO)$> K(t) \geqslant K(1)$

$= \int N_H * [\Phi(x)]^{N-1}\phi(x)dx = \int N_H * [\Phi(x)]^{N-1}d\Phi(x) = \frac{N_H}{N}$ ▮

A.2 Proof of Proposition 2

Proof P (Type γ_H is hired as CEO)

$> \sum_{N_H=1}^{N} \frac{N!}{N_H!(N-N_H)!} p^{N_H}(1-p)^N * \frac{N_H}{N} = p$ ▮

A.3 Proof of Proposition 3

Proof Similar to the proof of Proposition 2, I first fix the composition of the candidate pool, derive the result and then let the composition be randomly determined.

For the $N-M$ candidates that the firm cannot directly observe abilities, suppose N_H are of type γ_H and N_L of type γ_L.

Then the probability of γ_H type in group 2 being hired as CEO is

$$\text{P(H)}= \int [\Phi(\frac{\alpha x+\beta}{\sigma_A})]^M [\Phi(\frac{x-\mu_L}{\sqrt{\sigma_L^2+\sigma_A^2}})]^{N_L} N_H [\Phi(\frac{x-\mu_H}{\sqrt{\sigma_H^2+\sigma_A^2}})]^{N_H-1} \frac{1}{\sqrt{\sigma_H^2+\sigma_A^2}} \phi(\frac{x-\mu_H}{\sqrt{\sigma_H^2+\sigma_A^2}})dx$$

$$> N_H \int [\Phi(\frac{\alpha x+\beta}{\sigma_A})]^M [\Phi(x)]^{N-1}\phi(x)dx = \int N_H[\Phi(x)]^{N-1}d\Phi(x)$$

by the same argument as in the proof of Lemma 1.

Similarly, the probability of γ_L type in group 2 being hired as CEO is,

$$\text{P(L)} = \int [\Phi(\frac{\alpha x+\beta}{\sigma_A})]^M \Phi(\frac{x-\mu_H}{\sqrt{\sigma_H^2+\sigma_A^2}})]^{N_H} N_L [\Phi(\frac{x-\mu_L}{\sqrt{\sigma_L^2+\sigma_A^2}})]^{N_L-1} \frac{1}{\sqrt{\sigma_L^2+\sigma_A^2}} \phi(\frac{x-\mu_L}{\sqrt{\sigma_L^2+\sigma_A^2}})dx$$

$$< N_L \int [\Phi(\frac{\alpha x+\beta}{\sigma_A})]^M [\Phi(x)]^{N-1}\phi(x)dx = \int N_L[\Phi(x)]^{N-1}d\Phi(x)$$

Therefore, given a candidate in group 2 is hired, the conditional probability that she is of type γ_H is

$$\frac{P(H)}{P(H)+P(L)} > \frac{N_H}{N-M}$$

Now let N_H and N_L be binomial random variables, but M still fixed. By the same the argument as in Proposition 2, given a candidate in group

2 is hired, the conditional probability that she is of type γ_H is greater than p.

And since risk preference has no role in assessing group 1's ability, given a candidate in group 1 is hired, the conditional probability that she is of type γ_H is equal to p.

We have,

P(Type γ_H is hired)

=P(group 1 is hired)P(Type γ_H is hired|group 1 is hired)

+P(group 2 is hired)P(Type γ_H is hired|group 2 is hired) $>$ p ∎

A.4 Proof of Proposition 4

Proof Let inside\outside denote the event that an inside\outside candidate is hired, γ_i the event type γ_i is hired, $i \in (L, H)$, G1 and G2 the events group 1 or group 2 candidate is hired.

P(γ_H|outside)

=P(G1|outside)P(γ_H|outside, G1)+P(G2|outside)P(γ_H|outside, G2)

=P(G1|outside)P(γ_H|G1)+(1-P(G1|outside))P(γ_H|G2)

and

P(γ_H|inside)

=P(G1|inside)P(γ_H|inside, G1)+P(G2|inside)P(γ_H|inside, G2)

=P(G1|inside)P(γ_H|G1)+(1-P(G1|inside))P(γ_H|G2)

From the proof of Proposition 3, we know P(γ_H|G1)=p, P(γ_H|G2)$>$ p. And because P(G1|outside)<P(G1|inside)

P(γ_H|outside)>P(γ_H|inside) ∎

B Variable Definitions

This appendix defines the variables used in the paper. Compustat data items are defined by their corresponding data item number. Monthly stock return data are from CRSP. Accounting data are from Compustat. Executive compensation data and deferred compensation are from EXECUCOMP.

CEO=1 if the executive was CEO of the company in that year, otherwise CEO=0

CFO=1 if the executive was CEO of the company in that year, otherwise CFO=0

Male=1 if the executive is Male, otherwise Male=0

Outside=1 if CEO of the company is hired from outside. Outside=0 if CEO of the firm is hired from inside.

Deferred Compensation Account Investment Return=Aggregate Earnings\(Aggregate Balance-0.5*(Aggregate Earnings+Contribution by Company+Contribution by Executive-Aggregate Withdraw))

Deferred Compensation Account Investment Return Volatility=|Deferred Compensation Account Investment Return-US treasury 1-year bill interest rate|

Total Compensation=TDC2 in EXECUCOMP

Stock Holdings=Number of Stocks Held by the Executive Excluding Options*Stock Price at the end of FY

ROA=data13\data6

Market-to-Book=(data6-data60+data100*data25)\data6

Sales=data12

R&D=data46\data6

Leverage=(data9+data34)/data6

Industry Dummy= Two-digit SIC Code

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Table 1: Summary Statistics of Executive Deferred Compensation Account and Other Characteristics

	CEO	Non-CEO
Contribution by the Company ($000)	411	140
	(1842)	(606)
Contribution by the Executive ($000)	205	57
	(2839)	(344)
Aggregate Earnings ($000)	89	36
	(3254)	(898)
Aggregate Withdraw ($000)	332	160
	(3540)	(2415)
Aggregate Balance at End of FY ($000)	4559	1479
	(12826)	(4868)
Deferred Compensation Account Investment Return	0.032	0.034
	(0.24)	(0.23)
Deferred Compensation Account Investment Return Volatility	0.16	0.15
	(0.21)	(0.18)
Male	0.97	0.92
	(0.16)	(0.27)
Total Compensation($000)	8670	2693
	(32808)	(5606)
Option Compensation\Total Compensation	0.33	0.26
	(0.83)	(0.49)
Stock Holdings\Total Compensation	29	24
	(337)	(1705)
Number of Observations	3088	12370

The sample consists of firms covered in EXECUCOMP from 2006-2009. Stock price and US treasury bill 1 year interest rate are from CRSP. All other data items are from EXECUCOMP. The table lists the means of the variables, standard deviations are in the bracket.

Table 2: Analysis of Investment Return Volatility of Deferred Compensation Account as a function of CEO

	(1)	(2)	(3)	(4)
Intercept	0.13***	0.13***	-0.25**	-0.26**
	(6.21)	(6.21)	(2.48)	(2.51)
CEO	0.015***	0.016***	0.013***	0.014***
	(4.28)	(4.43)	(4.23)	(4.45)
CFO	0.0043	0.0043	0.0039	0.0039
	(1.18)	(1.17)	(1.23)	(1.22)
Age	-0.0011***	-0.001***	-0.0007***	-0.0007***
	(5.11)	(5.01)	(3.89)	(3.82)
Male	0.0014	0.0014	-0.0025	-0.0025
	(0.25)	(0.26)	(0.53)	(0.51)
Total Compensation($000)	$7 * 10^{-8}$		$1 * 10^{-7}$	
	(0.79)		(1.36)	
Option Compensation\Total Compensation	$-6.6 * 10^{-4}$	$7.1 * 10-4$	0.0011	0.001
	(0.28)	(0.30)	(0.53)	(0.5)
Stock Holdings\Total Compensation	$-5 * 10^{-8}$	$5.3 * 10^{-8}$	$2.6 * 10^{-8}$	$2.1 * 10^{-8}$
	(0.057)	(0.06)	(0.03)	(0.027)
Year Dummy	Yes	Yes	No	No
Industry Dummy	Yes	Yes	No	No
Firm-Year Fixed Effect	No	No	Yes	Yes
Number of Observations	15458	15458	15458	15458
R^2	0.15	0.15	0.2	0.2

This table presents the results regarding the relationship between whether the executive is CEO and deferred compensation account investment return volatility. Data are from EXECUCOMP. Robust t-statistics are presented in the brackets below the estimates, with *, **, *** indicationg significance level of 5%, 1%, 0.1% levels.

Table 3: Analysis of Investment Return Volatility of Deferred Compensation Account as a function of CEO Excluding Firms Where CEOs Are Founders

	(1)	(2)	(3)	(4)
Intercept	0.13***	0.13***	-0.021	-0.021**
	(6.08)	(6.08)	(1.92)	(1.96)
CEO	0.015***	0.015***	0.014***	0.013***
	(4.02)	(4.16)	(4.00)	(4.25)
CFO	0.0049	0.0049	0.0038	0.0038
	(1.30)	(1.29)	(1.16)	(1.17)
Age	-0.001***	-0.001***	-0.0008***	-0.0008***
	(4.80)	(4.77)	(4.19)	(4.11)
Male	0.005	0.005	-0.0009	-0.001
	(0.88)	(0.88)	(0.21)	(0.19)
Total Compensation($000)	$6.8 * 10^{-8}$		$9.7 * 10^{-8}$	
	(0.74)		(1.03)	
Option Compensation\Total Compensation	-0.0027	-0.0024	-0.0007	-0.0007
	(0.54)	(0.57)	(0.16)	(0.21)
Stock Holdings\Total Compensation	$4.8 * 10^{-8}$	$5.2 * 10^{-8}$	$2.3 * 10^{-8}$	$2.1 * 10^{-8}$
	(0.06)	(0.058)	(0.032)	(0.029)
Year Dummy	Yes	Yes	No	No
Industry Dummy	Yes	Yes	No	No
Firm-Year Fixed Effect	No	No	Yes	Yes
Number of Observations	13952	13952	13952	13952
R^2	0.15	0.15	0.2	0.2

This table presents the results regarding the relationship between whether the executive is CEO and deferred compensation account investment return volatility excluding firms where the CEO is the founder. Data are from EXECUCOMP. Robust t-statistics are presented in the brackets below the estimates, with *, **, *** indicating significance level of 5%, 1%, 0.1% levels.

Table 4: Summary Statistics of Outside and Inside CEO Deferred Compensation Accounts and other Characteristics

	Outside	Inside
Contribution by the Company ($000)	357	336
	(1577)	(1416)
Contribution by the Executive ($000)	100	216
	(644)	(1415)
Aggregate Earnings ($000)	0.91	116
	(2227)	(3369)
Aggregate Withdraw ($000)	187	158
	(1897)	(1396)
Aggregate Balance at End of FY ($000)	3111	4418
	(7436)	(12409)
Deferred Compensation Account Investment Return	0.031	0.033
	(0.25)	(0.23)
Deferred Compensation Account Investment Return Volatility	0.18	0.15
	(0.18)	(0.17)
Age	56	55.4
	(6.61)	(6.22)
Male	0.97	0.97
	(0.17)	(0.17)
Total Compensation ($000000)	8.7	8.96
	(23.9)	(37.05)
Option Compensation\Total Compensation	0.33	0.46
	(0.5)	(0.52)
Stock Holdings\ Total Compensation	9.92	19.65
	(16.78)	(36.7)
Sale ($000000)	6.74	10.84
	(14.67)	(23.08)
ROA	0.11	0.12
	(0.089)	(0.095)
Market-to-Book	1.64	1.61
	(0.83)	(0.81)
Number of Observations	905	2183

The sample consists of firms covered in EXECUCOMP from 2006-2009. Stock price and one-year US treasury bill interest rate are from CRSP. Data on financial items are from COMPUSTAT. All other data items are from EXECUCOMP. The table lists the means of the variables, standard deviations are in the bracket.

Table 5: Regression of Deferred Compensation Account Investment Return Volatility with respect to Outside or Inside CEO

	(1)	(2)
Intercept	0.062	0.061
	(1.42)	(1.41)
Outside	0.023***	0.024***
	(3.73)	(3.74)
Aggregate Balance at end of FY($000)	$2.3 * 10^{-7}$	$2.3 * 10^{-7}$
	(0.36)	(0.32)
Male	0.028	0.028
	(1.61)	(1.63)
Age	-0.0012**	-0.0012**
	(2.72)	(2.65)
Total Compensation($000)	0.00011	
	(1.34)	
Option Compensation\Total Compensation	-0.001	-0.0011
	(0.6)	(0.62)
Stock Holdings\Total Compensation	$1.7 * 10^{-5}$	$1.8 * 10^{-5}$
	(0.66)	(0.67)
Sale($000000)	$-2.8 * 10^{-7}$	$-2.6 * 10^{-7}$
	(1.87)	(1.73)
ROA	-0.051	-0.05
	(1.16)	(1.14)
Market-to-Book	0.002	0.002
	(0.0049)	(0.0047)
Year Dummy	Yes	Yes
Industry Dummy	Yes	Yes
Number of Observations	3088	3088
R^2	0.22	0.22

This table presents the results regarding the relationship between whether the CEO is hired outside the company and deferred compensation account investment return volatility. Robust t-statistics are presented in the brackets below the estimates, with *, **, *** indicating significance level of 5%, 1%, 0.1% levels.

Table 6: Glejser Heteroskedasticity Tests for Monthly Stock Returns as a Function of Outside CEO and Control Variables

Intercept	0.106***
	(18.6)
Outside	0.0043***
	(5.54)
Male	1.23
	(0.35)
Age	$7 * 10^{-5}$
	(1.22)
Total($000,000)	$3.7 * 10^{-5}$**
	(2.97)
Option Compensation\Total Compensation	$-9 * 10^{-5}$
	(0.7)
Stock Holding\Total Compensation	$2.21 * 10^{-7}$
	(0.11)
Sale($000,000)	−0.00029***
	(13.8)
ROA	-0.14***
	(22.9)
Market-to-Book	0.0035***
	(6.15)
Year-Month Dummy	Yes
Industry Dummy	Yes
Number of Observation	66802
R^2	0.107

This table presents the results of Glejser's(1969) heteroskedasticity tests for the firm's monthly stock return. The data are from 2004-2009. Robust t-statistics are presented in the brackets below the estimates, with *, **, *** indicating significance level of 5%, 1%, 0.1% levels.

Table 7: Cross-sectional regressions of standard deviations of stock returns on outside CEO and other control variables

Intercept	0.137***
	(11.3)
Outside	0.0032**
	(2.84)
Male	1.65
	(0.85)
Age	$7 * 10^{-5}$
	(0.53)
Total($000,000)	$-7.3 * 10^{-6}$
	(0.25)
Option Compensation\Total Compensation	0.00018
	(0.67)
Stock Holding\Total Compensation	$-1.5 * 10^{-5}$
	(3)
Sale($000,000)	-0.0031***
	(6.42)
ROA	-0.17***
	(15.8)
Market-to-Book	0.0031***
	(8.73)
Year Dummy	Yes
Industry Dummy	Yes
Number of Observation	5628
R^2	0.41

This table presents the results regarding the relationship between outside CEO and within-firm over-time variablity of the firm's monthly stock return. The data are from 2004-2009. Robust t-statistics are presented in the brackets below the estimates, with *, **, *** indicating significance level of 5%, 1%, 0.1% levels.

Table 8: Regression of Spending on R&D on Outside CEO and other control variables

Intercept	0.0037
	(0.51)
Outside	0.0053***
	(5.31)
Male	0.0078*
	(2.47)
Age	0.00022**
	(3.02)
Total($000,000)	$2.5 * 10^{-5}$
	(1.53)
Option Compensation\Total Compensation	0.00052***
	(3.5)
Stock Holdings\Total Compensation	$-1.4 * 10^{-5}$***
	(5.2)
Sale($000,000)	$2.7 * 10^{-5}$
	(1)
ROA	-0.0012
	(0.2)
Market-to-Book	0.0036***
	(18.5)
Year Dummy	Yes
Industry Dummy	Yes
Number of Observation	5628
R^2	0.45

This table presents the results regarding the relationship between outside CEO and R&D Expenditure. The data are from 2004-2009. R&D expenditure is scaled by book value of assets at the beginning of the period. Robust t-statistics are presented in the brackets below the estimates, with *, **, *** indicating significance level of 5%, 1%, 0.1% levels.

Table 9: Regression of Leverage on whether CEO is hired from outside and other control variables

Intercept	0.028***
	(6.58)
Outside	0.011*
	(2.37)
Male	-0.055
	(1.23)
Age	0.0038
	(1.07)
Total($000,000)	-0.00011
	(1.38)
Option Compensation\Total Compensation	0.0019**
	(2.54)
Stock Holding\Total Compensation	$-9.7 * 10^{-6}$
	(0.74)
Sale($000,000)	0.00036**
	(2.74)
ROA	-0.14***
	(4.82)
Market-to-Book	-0.0019*
	(2)
Year Dummy	Yes
Industry Dummy	Yes
Number of Observation	5628
R^2	0.36

This table presents the results regarding the relationship between outside CEO and book leverage ratio. The data are from 2004-2009. Robust t-statistics are presented in the brackets below the estimates, with *, **, *** indicating significance level of 5%, 1%, 0.1% levels.