MORAL HAZARD AND ADVERSE SELECTION OF EXECUTIVE COMPENSATION

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ABSTRACT

This dissertation investigates the structure of incentive contracts in which adverse selection problems are more severe. Specifically, I examine the moderating effect of R&D intensity on the relative weights placed on signals of ability and on performance measures in executive compensation. Furthermore, I also investigate the determinants on the compensation of university presidents. I find that that more weight is placed on signals of ability in R&D intensive firms and less weight is placed on performance measures. I find that R&D intensive firms pay more to executives with technical work experience and/or relevant educational degrees. Additionally, in the context of university presidents, the positive association between organizational complexity and executive compensation is driven by the role of managerial ability rather than by effort. This result also suggests that considering measures of organizational complexity (such as firm size and diversification) as control variables in empirical studies of executive compensation is the appropriate means by which to account for the impact of organizational complexity.

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CHAPTER 1
INTRODUCTION

This dissertation examines the economic determinants of executive compensation in the presence of both moral hazard and adverse selection problems. Specifically, I examine the impact of R&D intensity on incentive contracts and the determinants of university presidents' compensation. In these two contexts, executives' abilities need to be considered heavily in their incentive packages in addition to the performance measures.

Agency theory posits that there are two reasons why executive compensation should be made contingent on performance measures. First, there is the moral hazard problem, which arises because managerial effort is unobservable (Jensen and Meckling, 1976; Holmstrom, 1979; Holmstrom and Milgrom, 1987). Under the premise that performance measures are informative signals of effort, the principal designs the agent's compensation to be contingent on such measures so as to better align the agent's interests with those of the principal, and thereby elicit the desired level of managerial effort. Second, there is the adverse selection problem, which arises because managerial ability is unobservable (Darrough and Melumad, 1995; Harris and Raviv, 1978; Rothschild and Stiglitz, 1976; Spence, 1973; Salop and Salop, 1976; Wilson, 1977). To ensure the agent has the incentive to truthfully reveal his ability, the principal designs the agent's compensation to be contingent on performance measures so as to enable screening (or sorting) across agents of heterogeneous ability. Both sources of asymmetric information suggest that pay should increase with performance measures, as has long been postulated (Larcker, 1983; Murphy, 1985; Sloan 1993) and on which there is extensive evidence (Healy, 1985; Lambert and Larcker, 1987; Sloan, 1993; Bushman et al., 1995, 1996; Ittner et al., 1997).

Empirical studies on executive compensation have generally focused, however, on moral hazard and have not taken into account adverse selection. In a theoretical model with one unobservable action and two noisy signals of the outcome of interest to the principal, Banker and Datar (1989) show that a signal should be assigned more weight if, and only if, it is more informative. Also, there is extensive empirical evidence that executives are rewarded on the basis of different financial performance measures, such as accounting and market measures (e.g., Healy, 1985; Lambert and Larcker, 1987; Sloan, 1993; Bushman et al., 1996; and Ittner et al., 1997).

I employ two contexts to examine the determinants on optimal incentive contracts by considering both moral hazard problems and adverse selection problems. First, this dissertation investigates the moderating effect of R&D intensity on weights placed on signals of ability and performance measures in executive compensation contracts. Specifically, I examine the specific type of signals of ability that are relevant in R&D intensive firms. Second, the compensation of university presidents provides another appropriate empirical context within which to test the impact of ability measures on incentives.

R&D intensity influences executive compensation due to the fact that R&D intensive firms place high requirements on a CEO's managerial ability. R&D intensive firms are said to be unique in several ways. They are technology-intensive and have managerial flexibility, they have a higher competitive risk, and they maintain information confidentiality (Gomez-Mejia, and Lawless, 1990; Kobrin, 1991). The application of technology extends from the beginning of the scientific idea to the sale and profit derived from a product. Furthermore, executives face greater difficulty in managing R&D

employees and coordinating different departments. The turnover of key R&D employees may bring significant loss because they may have sensitive information about R&D projects. R&D intensity also affects the difficulty of coordinating all other departments (e.g., marketing) as they, too, must learn pertinent information. Moreover, R&D intensive firms face higher competitive and technological risks in an ever- changing environment. Finally, a strong safeguard is necessary to keep the confidentiality of a firm's core technology.

Overall, an ideal CEO candidate for R&D intensive firms should possess the following abilities: a keen insight into technology innovation; a quick response to environmental change; the managerial dexterity to rein in the R&D labor force; and a strong sense of intellectual property protection. The higher the R&D intensity of the firm, the greater the extent to which the long-term outcome can be affected by the executive's ability. R&D intensity places a premium on the ability of executives' decision making. The role of ability in generating revenue increases with the challenge and complexity of managerial tasks. It follows, therefore, that adverse selection problems are more severe in R&D intensive firms, in light of the fact that such skills are difficult to discern. I expect more weight is placed on signals of ability in R&D intensive firms. Indeed, the compensation contracts of R&D intensive firms serve not only to motivate managerial effort (so as to resolve moral hazard problems) but also as a screening device to attract and retain high ability agents (so as to resolve adverse selection problems).

On the one hand, I expect higher weights on the following human capital measures in executive compensation contracts of R&D intensive firms: whether they have industry-related technical work experience, whether they have a degree in science or engineering, and whether they have worked in relevant R&D industries. I expect executives with these relevant experiences and education to be more capable at managing R&D intensive firms. A deep understanding of complex technology is helpful to direct resources among competing R&D projects (Henderson and Fredrickson 2001). On the other hand, I expect that the weights on having an MBA degree and CEO tenure decrease with R&D intensity because they are not valued in R&D intensive firms. An MBA degree is a proxy of general managerial ability (Murphy and Zabojnik, 2004, 2007), not relevant skills. Also, I expect that executive compensation in R&D intensive firms decreases with CEO tenure because creativity diminishes with tenure and new perspectives from outsiders are needed to keep creativity in such firms, which is consistent with evidence that CEO turnover is high in the information technology industry (Anderson et al., 2000).

Furthermore, I expect that weights on performance measures decrease with R&D intensity. I argue that the relationship between pay-for-performance sensitivity and R&D intensity is driven by the fact that the intrinsic value of R&D intensive firms is hard to discern. The intrinsic value, which consists of future cash flows, is known exclusively to insiders. Both accounting and stock returns are noisier signals of firms' intrinsic value in R&D intensive firms. In other words, both of them are not very precise to reflect the intrinsic value of these firms. Expected profits from future investments represent a large portion of corporate value in these firms (Smith and Watts, 1992; Gaver and Gaver, 1995). Nevertheless, the future benefits derived from R&D investments are not fully captured by the current stock price (Lev and Sougiannis, 1996). Skinner and Sloan (2002) show that stock markets ignore management expectations when short-term earnings meet or beat analysts' forecasts. Stock returns do not accurately reflect a firm's intrinsic value in R&D intensive firms. When executives perform actions that aim to increase firm value in the long run, as is common in high R&D intensive firms, accounting and stock returns are thereby not adequate means by which to monitor those actions, thus they should be assigned less weights in compensation schemes.

Using a sample (1992 to 2006) from the ExecuComp database, I examine how R&D intensity influences the pay-for-performance sensitivity of chief executive officer (CEO) compensation. My study continues with factors that determine the proportion of CEO compensation which is not based on financial performances. Personal data are hand-collected from CEOs' biographies which are available in *Marquis Who's Who*.

Moreover, while academics have overwhelmingly investigated the determinants on compensation for corporate executives, there are limited studies on compensation packages for university presidents. With few exceptions (e.g., Pfeffer and Ross, 1988; Ehrenberg, et al., 2001), minimal academic attention has been paid to the area of compensation for university presidents.

The agency problems with university presidents are comparable to those with corporate executives. While Board of Directors delegate management activities to corporate executives, university presidents are named by Board of Trustees (Appendix I shows the composition and responsibilities of Princeton University's Board of Trustees). Thus, it is clear that the responsibilities of presidents are subject to agency problems. Cornell (2004) finds that compensation of presidents of elite private universities are only 5% of S&P 500 CEOs. He argues that "Universities specifically search for people who value the non-pecuniary aspects of the job such as the chance to make a social contribution and the opportunity to lead a great institution." Since the compensation contract is not designed to "incentivize" the president's actions, universities may prefer compensation plans based on ability measures. An optimal ability-based compensation will recruit high-ability agents associated with high compensation.

Unlike the compensation of corporation CEOs that generally includes salary, bonus, stock options, short-term incentives, and long-term incentives, the compensation for university presidents consists only of a fixed salary and benefits. (An example of an actual contract of a university president is shown in Appendix II.) A large portion of corporate executives' compensation is contingent on performance measures. The salary of a university president accounts for about 80% of the total compensation package on average. The salary is set in advance and is not contingent on performance measures.

Also, it is difficult to measure the performance of university presidents. The activities of university presidents are diversified, ambiguous, non-routine, and challenging to monitor. Specifically, university presidents interact with the community at large, operate as fund raisers, and balance the competing goals of departments and institutions (Dunn et al., 1985; Cote, 1985; Alpert, 1985). Some presidents work hard to maintain their university's stature, while others focus on improving it (Bartlett and Sorokina, 2005). Furthermore, given that the performance and tasks of university presidents are difficult to measure and define, the compensation of university presidents should depend less heavily on performance measures and more heavily on ability measures, such that they may serve as a tool by which to screen candidates. In other words, incentive contracts of university presidents should serve more as a mechanism by which to screen candidates rather than as a tool by which to implement high effort. This suggests that the adverse selection problem should play a greater role than the moral hazard problem in the compensation of university presidents. Indeed, according to adverse selection theory, ability-based incentive contracts are in part a means by which to recruit high ability agents (Stiglitz, 1977; Lazear, 2000; Darrough and Melumad, 1995).

I construct a sample drawn from 279 private universities spanning the academic years 2001-2002 to 2005-2006, yielding a total of 1,011 university-year observations. I obtained compensation data from the Chronicle of Higher Education. The Integrated Postsecondary Education Data System (IPEDS) provides five variables from which I construct two measures of organizational complexity, a factor of university stature, and the university enrollment. The factor of university stature is constructed by the four variables: the quality of enrolled students, the average salary of professors, tuition, and the size of the endowment. I hand-collected personal data from the biographies of university presidents, obtained from the Marquis Who's Who. This includes five variables by which to measure the president's ability: a factor based on four measures of their experience, whether they have a law degree, and whether they previously served in an administrative capacity, as a tenured professor, or as a university president. I construct two measures of the president's performance: the percent change in the university's stature and enrollment.

This dissertation contributes to executive compensation literature in three important ways. First, I focus on the severity of adverse selection problems relative to moral hazard problems. Although prior studies have investigated the influence of R&D intensity on executive compensation, how R&D intensity impact the weights placed on the signals of ability has not been explored. I consider the types of skills that are more valuable to R&D

intensive firms. Human capital theory suggests that workers are rewarded with benefits and pay premiums for their investment in skills, such as education and experience (Becker, 1964; Mincer, 1970). Managerial skills increase the productivity of executives and are essential to the success of firms (Ang and Nagel 2008; Kaplan et al. 2008). I find that R&D intensive firms compensate CEOs with technical work experience and relevant education to a greater extent. I also find that CEOs with MBA degrees or longer tenure generally are paid less in R&D intensive firms than they are in non-R&D intensive firms.

Second, I investigate the relative weights on performance measures in incentive contracts. I find that CEO compensation contracts place less weights on both the accounting and stock returns for R&D intensive firms relative to non-R&D intensive firms. This extends prior studies on the relationship between R&D intensity and executive compensation. Although R&D investments are important for firms' long-term profits, myopic behavior occurs when CEOs focus on current earnings (Narayanan, 1985; Watts, 1986; Cheng, 2004). Prior studies have shown that incentives based on stock returns are helpful in mitigating the opportunistic behaviors of executives and that accounting earnings in R&D intensive firms are less relevant to their market value. Consistent with Kole (1997) and Smith and Watts (1992), I find equity-based pay is higher in R&D intensive firms. However, this does not mean the compensation is more related to the current stock return in R&D intensive firms. Both stock option and restricted stock are long-term incentives which are more related to the future stock return. My results show that total compensation is less related to stock returns in these firms because stock prices generally do not reflect the intrinsic value of R&D intensive firms.

Finally, this dissertation comprehensively investigates the determinants on the compensation of university presidents. The following illustrates my four main findings: First, four of my five measures of ability have significant positive effects on the total compensation of university presidents. The exception is having experience in university administration, which has an insignificant effect on compensation. Second, both the stature and enrollment of the presidents' past university (which are signals of his ability) have significant positive effects on their present compensation. Third, the moderating effects of organizational complexity on the weights placed on the two performance measures are insignificant. This agrees with evidence in Baker and Hall (2004) that CEO incentives are roughly constant with firm size. This suggests that the return on managerial effort does not depend on organizational complexity. Thereby, the positive association between organizational complexity and the compensation of university presidents is driven by the role of managerial ability as opposed to effort. In light of this finding, including measures of organizational complexity (such as the firm's size and extent of diversification) as control variables in empirical studies of executive compensation is the appropriate means by which to account for the impact of organizational complexity, as has been the practice in the literature. Fourth, university stature and enrollment have significant positive effects on compensation. This suggests that the return on the dimension of managerial ability that is unobservable to researchers is enhanced in more complex organizations.

The remainder of the paper is organized as follows. Chapter 2 presents literature review on executive compensation and presents moral hazard and adverse selection that distinguishes between the roles of managerial effort and ability in setting executive compensation. Chapter 3 describes the hypotheses, research design, sample selection and empirical results for the study examining the impact of R&D intensity on executive compensation. Chapter 4 describes the hypotheses, research design, sample selection and the empirical results for the study examining the compensation of university presidents. Chapter 5 concludes.

CHAPTER 2

LITERATURE REVIEW

Agency Theory

Agency problems arise from the separation of ownership and management in modern corporations (Jensen and Meckling, 1976; Fama, 1980). Agents choose the actions that maximize their own interest, despite the fact that agents work on behalf of principals. Agency theory addresses the problems of both moral hazard and adverse selection that arise from information asymmetries between agents and principals. Agency theory posits that incentive contracts can be designed to align the interest of managers and owners (Jensen and Zimmerman, 1985; Eisenhardt, 1989).

According to moral hazard theory, effort-averse agents tend to engage in behavior that sacrifices shareholders' interests. Jensen and Meckling (1976) describe performance measures as signals of the unobservable actions undertaken by agents. Numerous studies argue that performance-based compensation enhances congruence in the goals of agents and principals, motivating executives to work hard so as to improve firm value (Holmstrom, 1979; Banker and Datar, 1989; Bushman and Indjejikian, 1993; Feltham and Xie, 1994; Datar et al., 2001). Holmstrom (1979) developed a moral hazard model in which incentive contracts using performance measures align the interests of principals and agents. Banker and Datar (1989) examine the relative weights that should be placed on noisy signals of the outcome of interest to the principal. They find that a signal should be assigned relatively more weight if it is more precise or sensitive. In multiple-action models of moral hazard, Feltham and Xie (1994) and Datar et al. (2001) extend the results in Banker and Datar (1989) by examining the agent's allocation of effort across multiple actions, so as to determine how this allocation process impacts the relative weights on performance measures. Overall, the implications stemming from moral hazard theory are that pay should increase with better performance (Larcker, 1983; Murphy, 1985; Sloan 1993). Accordingly, there is extensive evidence that executives are rewarded on the basis of different performance measures, such as accounting and market measures (e.g., Healy, 1985; Lambert and Larcker, 1987; Sloan, 1993; Bushman et al., 1996; Ittner et al., 1997).

Another stream of research on executive compensation focuses on adverse selection problems that arise from the premise that the agent's ability is unknown to the principal. Highly capable candidates for a managerial position need to be paid more attractive compensation than candidates with low managerial talent (Stiglitz, 1977; Lazear, 1986; Darrough and Melumad, 1995). Adverse selection theory examines contracts that take into account different abilities of agents in a variety of settings (Harris and Raviv, 1978; Rothschild and Stiglitz, 1976; Spence, 1973; Salop and Salop, 1976; Wilson, 1977). Managerial compensation is associated with signals that are noisy measures of an individual's ability to manage an organization; such signals include education, experience, and background (Spence, 1973). Rose and Shepard (1997) find that executives are paid more in firms that are heavily diversified because of matching between high-ability CEOs and firms that are difficult to manage. Henderson and Fredrickson (1996) find that executive compensation is positively related to information-processing ability because "the ability to cope with large volumes of diverse information is likely to be both rare and critical to organizational performance."

Prior empirical studies have employed some observable human capital measures as signals of ability, such as working experience and education and background (Fisher and Govindarajan, 1992; Hogan and Mcpheters 1980; Henderson and Fredrickson, 1996). Human capital theory argues that a premium is paid for human capital investment which can increase the productivity of workers (Becker 1964). The level of education signals the ability of managers also due to the screening process of education (Spence 1973). However, some general human capital measures such as an MBA degree may not be valued in R&D intensive firms because of the uniqueness of managing R&D activities.

Managerial ability of executives is not perfectly known to the principals (Murphy 1986; Holmstrom 1999). Although the board of directors can partly observe the managerial ability from their background, prior experience and interview processes, it is hard to discover the real managerial ability thoroughly. Usually, the agents know better about their ability than the principals. Adverse selection problems exist because of the partially unobservable ability of executives.

To summarize, a principal may assign positive weight to noisy signals of the outcome for two reasons. First, there is the moral hazard problem. If the signals are sensitive or precise, then they enable the principal to better estimate the effort exerted by the agent; thus, when the signals are assigned positive weights, they encourage the agent to exert higher effort. Second, there is the adverse selection problem. In assigning positive weights to the performance measures, the principal provides the agent with the incentive to reveal the truth about his hidden ability; in other words, it enables the revelation mechanism.

CHAPTER 3
R&D INTENSITY AND EXECUTIVE COMPENSATION

Empirical Hypotheses

Prior studies find that R&D intensive firms pay more to their executives. For example, executives in high growth firms are paid more because higher ability is required to manage intangible assets associated with innovation activities (Smith and Watts 1982). Holthanusen et al. (1995) find that the total compensation for a divisional CEO is positively related to the innovative output (patents granted, for example) within the division. However, Anderson et al. (2000) provide evidence that information technology firms grant their executives greater stock options, but do not grant higher total compensation than non-information technology firms after controlling for performance and other economic factors. Kole (1997) finds that R&D intensity is positively related to "the likelihood that a firm will have at least one compensation plan that authorize equity remuneration for managers." Duru et al. (2002) show that income-decreasing strategic expenditures do not reduce executives' pay because compensation committees shield CEOs from their income-decreasing effect. Overall, these studies have not investigated the influence of signals of ability on executive compensation in R&D intensive firms.

This dissertation focuses on the moderating effects of R&D on the weights on signals of ability and performance measures in compensation contracts. This focus is due to the relative importance of managerial ability increases in R&D intensive firms. R&D intensive firms are particularly interesting in the study of the structure of executive compensation because of the following: corporate R&D expenditures are one of the sources to gain a competitive advantage, theses expenditures are central components of inventive activity, and they are important to economic growth and productivity (Bhagat and Welch, 1995). Schumpeter (1939, 1942) proposed that "the economy is driven by the invention of new technology and the availability of short-term monopoly rents." R&D intensive firms play an increasingly important and unique economic role (D' Aveni, 1994). R&D activities create and maintain technological innovation which is a source of competitive advantages for US firms (Porter, 1985, 1990; Arora et al., 2001; Woolridge, 1988; Jacobs, 1991). Competitive advantages that are developed by R&D activities are difficult to imitate since these technologies may be complex and protected by patents, licensing, or copyrights. Given the increasing importance of technology in today's global business, it is thereby of interest to investigate the impact of R&D intensity on management incentives.

The core features of R&D intensive firms include higher levels of technology, innovation, managerial flexibility, and dynamism (Gomez-Mejia, and Lawless, 1990; Kobrin, 1991). The higher the R&D intensity, the more complex the executives' task will be. This is as a result of the following.

First, R&D intensive firms are characterized by intensive technology innovation. Executives need to have a deep understanding of the underlying technology to choose among competing R&D projects (Henderson and Fredrickson, 2001). Innovative activity and scientific discovery that exist in the inventive value chain extend through the research, development, and commercialization process (Nelson and Winter, 1977; Teece, 1986; Pisano, 1989). For example, "information-intensive institutions offer products and services that contain high information content and use sophisticated information technologies to deliver these products and services" (Palmer and Griffith, 1998).

Therefore, a CEO's education or background that is technology-relevant will complement his managerial expertise in these R&D intensive firms.

Second, a principal role of many CEOs is to adjust corporate strategy to fit the competitive risks of the product environment. The race to invest in R&D is very aggressive in high-technology industries such as computers, telecommunications, and video games (Dasgupta, 1988; Khanna, 1995). For instance, "in the computer industry, Moore's law refers to the now famous miniaturization hypothesis of Gordon Moore, one of the founders of Intel Corp., that the number of transistors on a chip would double every 18 months" as described in Ethiraj (2007). The development of product needs to evolve flexibly over time as R&D intensive firms are commonly operated in very dynamic and uncertain environments (MacCormack et al., 2001). The ability to acquire real-time information about markets is helpful to making timely decisions (Collins and Clark, 2003; Barney et al., 2001). Turbulent environmental conditions make the CEOs' job more challenging in R&D intensive firms. CEOs need to be flexible in their actions, and it is imperative that they respond quickly to all the strategies by their competitors and also to environmental changes. Executives need to invest in R&D projects and to market their new products speedily in order to gain a sustainable competitive advantage in their industry (Barry et al., 2006; Eisenhardt and Tabrizi, 1995; Ethiraj, 2007; Feeser and Willard, 1990).

Third, R&D intensive firms demand of the CEOs a high degree of managerial flexibility with respect to human resources. The strategic importance of the R&D labor force increases with R&D intensity (Yanadori and Marler, 2006). R&D employees' efforts directly influence the firms' innovative production. Workforces of R&D intensive firms are idiosyncratic, unstable, and limited. The R&D labor force needs more technical training (Griliches, 1987). Talented engineers and scientists who have doctorates, patents, and/or publications are relatively few. It is difficult to retain R&D employees for the long term. Yanadori and Marler (2006) argue that "High turnover of these employees is costly not only due to the costs of searching for and hiring new employees but also because new knowledge is often created through the interactions among R&D employees. Thus each employee is needed on a longer-term basis to capture learning curves that are synergistically developed with peers." Furthermore, it is difficult to monitor R&D activities because the results are not predictable and require the effort of team work (DiTomaso et al. 2007). Managerial flexibility is necessary to attract, retain, and motivate R&D employees (Collins and Clark, 2003; Gomez-Mejia and Balkin, 1992). The difficulty associated with coordination among different departments also increases with R&D intensity.

Fourth, tight control is required for intangible assets and corporate strategy information in R&D intensive firms. The leak of any information of R&D projects potentially allows competitors to reproduce them (Teece, 1986). Effective strategic protection mechanisms are crucial for firms that keep the R&D process in the forefront of their focus (Cassiman and Veugelers, 2007). R&D intensive firms may face numerous kinds of intellectual property litigation, as well. Maintaining the firms' profitability is greatly dependent on the protection of their intellectual property.

Overall, the characteristics of CEOs' duties in R&D intensive firms increase the marginal return on ability of executives in such firms. Because of the increased potential role of CEOs in R&D intensive firms, the selection of a CEO with the appropriate ability is acutely important. Therefore, adverse selection problems are especially relevant in compensation contracts so as to attract and retain the CEO that constitutes the best possible match. For example, the following statement is from the proxy statement of Electronic Data Systems Corp (EDS) for fiscal year 2005.

"*We are committed to paying executive officers performance-oriented compensation competitive with the market in which EDS competes for talent. Our primary goal is to create sustainable shareholder value by attracting and retaining accomplished and high potential executives and motivating and rewarding those executives for achievement of my short- and long-term goals and objectives.*

The market for EDS' executive talent is broader than the information technology ("IT") services industry. Accordingly, we review survey data for two distinct comparator groups prepared by an independent third-party consulting firm. One group consists of large global corporations similar in revenue and/or market capitalization to EDS, most of which are outside the IT services industry, with a sector weighting similar to the composition of the S&P 500 companies. The second group consists of companies in the IT services and related industries, without regard to revenue or market capitalization. The Committee periodically reviews these comparator groups to ensure they are a representative cross-section of the companies with which EDS competes for executive talent often with the use of an independent expert.

Our strategy is to ensure the overall level of our salary, annual bonus opportunity and long-term incentive compensation is competitive with the 50th percentile compensation at peer companies. Moreover, because we believe it is important to place a significant portion of each executive officer's total compensation at risk, we design my total compensation package to pay above the 50th percentile when EDS exceeds its goals and below the 50th percentile when EDS fails to meet its goals. "

Adverse selection problems are resolved by rewards based on ability signals since principals cannot observe the ability of agents directly. High-ability agents have the opportunity to reveal their private information or self-identify to the principals through signals. Managerial compensation is associated with ability signals, such as background or education, which are informative on their capability to manage an organization (Spence, 1973). These individual characteristic measures are not only signals but are also human capital investments from which people can acquire managerial skills. Managers learn and perfect their skills through work experience and education (Becker, 1964; Mincer, 1970). Human capital theory suggests that executives are rewarded premiums for their superior abilities.

The knowledge, skills, and expertise of CEOs, which they learned from technically related jobs, such as those of scientists or engineers, are more crucial to manage innovation activities in R&D intensive firms. Individuals with these backgrounds are more effective in reconciling corporate strategy with innovative activities. They also are more of a fit in an R&D intensive firms' culture of innovation and creativity (Wiersema and Bantel, 1992). Hambrick et al. (1992) argue that "the high technology organization must have substantial technical wherewithal. It seems reasonable to expect the same of the CEO." Thus, CEOs with relevant technology background have the advantage of instituting corporate strategy relating to innovation, attracting the most capable R&D employees, organizing R&D activity, and coordinating different departments. As these technical-related experiences are more valuable to R&D intensive firms, they are willing to pay more to attract and retain executives with this technical work experience.

Return on education is a popular topic in the arena of labor economics. Compensation to employees is definitely associated with a higher education over the past

30 years in the US (Murphy and Welch, 1992; Rumberger and Thomas, 1993; Light, 2001). Higher earnings accompany a higher education because productivity is commonly increased for workers with this level of education (Holzer and Neumark, 1999; Juhn et al., 1993). Prior studies document that managerial compensation is positively related to the level and specialty of education. For example, Fisher and Govindarajan (1992) find that the compensation of profit center managers is positively related to their level of education. Ang et al. (2002) document that the total compensation of IT professionals is positively associated with the level and occupational specificity of education. Similarly, I expect premiums are paid to CEOs with a degree in science or engineering in R&D intensive firms.

Managerial ability can also be revealed through executives' past experience. Executives who have worked in R&D intensive firms are likely to have more experience dealing with the challenges faced by these firms. Past experience is also a signal of managerial ability (Murphy, 1986; Holmstrom, 1999). Principals use agents' past experience to update their belief about their ability. For instance, the following is from the news of the CEO appointment at SAIC Inc, which is growing as a premier science, technology, and engineering firm: "The board and I are extremely pleased to have Walt join the company's executive management team. He has demonstrated an outstanding record of success at BAE Systems, where he managed the company's wholly owned U.S. subsidiary, with 53,000 employees and annual sales in excess of $20 billion. Walt brings more than 25 years of experience not only in my core competencies, but also in a wide range of services that will provide new avenues of growth for the company. Most importantly, he is committed to a high quality of performance, outstanding customer satisfaction, and high ethical standards -- hallmarks of SAIC's success since 1969." As R&D intensive firms have unique characteristics in investment decisions and technology environments, I argue that previous managerial experience in an R&D intensive firm will be useful to manage the current firm.

Therefore, I state my first hypothesis as follows:

Hypothesis 1: R&D intensive firms pay more to CEOs with technical work experience, a major in science or engineering, and past experience in R&D intensive industries.

Murphy and Zabojnik (2004) propose that general managerial ability is becoming more useful to manage modern companies than firm-specific ability. Consistent with this theory, empirical evidence shows that pay is higher for CEOs with an MBA degree which is a proxy of general managerial ability (Murphy and Zabojnik, 2007). Bertrand and Schoar (2003) find a positive relation between the return on assets and executives holding an MBA degree. However, an MBA degree may not be as useful in R&D intensive firms since “self-made” executives by their nature probably are more innovative and prone to take risks than MBA candidates (Collins and Moore, 1970). Hambrick and Mason (1984) argue that "Business schools are not particularly well inclined or equipped (at least to date) to develop innovative or risk-taking tendencies. The analytic techniques learned in an MBA program are geared primarily to avoiding big losses or mistakes."

CEO tenure can also influence executive compensation. On the one hand, prior studies have found that the compensation paid to CEOs is positively related to their tenure due to the facts that: (1) managerial power increases with tenure; and (2) firm-specific skills accumulate over time (Hogan and Mcpheters, 1980; Agarwal, 1981;

Finkelstein and Hambrick, 1989; Fisher and Govindarajan, 1992; Masulis and Mobbs, 2008). On the other hand, Hambrick and Finkelstein (1995) argue that "If the long-tenured CEO becomes very committed to established policies and strategies and gives little consideration to new directions, then the person's worth to the organization is diminished….. As long as the firm experiences 'satisfactory' experience, the executive will not be replaced. However, the CEO's compensation may start resembling the figurehead role he or she may have evolved into." I expect that executive compensation in R&D intensive firms decreases with CEO tenure because creativity diminishes with tenure. New perspectives from outsiders are needed to keep creativity in such firms. This is consistent with prior findings that CEO turnover is high in the information technology industry (Anderson et al., 2000).

Therefore, I state my second hypothesis as the following:

Hypothesis 2: The weights of compensation on the CEO's MBA degree and tenure as CEO decrease with R&D intensity.

Performance-based compensation is used to motivate executives to be more productive since performance measures can capture executive effort (Murphy, 1985; Antle and Smith, 1985; Lambert and Larcker, 1987; Jensen and Murphy, 1990; Indjejikian and Nanda, 2002). Agency theory explains that information asymmetry exits between agents and principals, i.e. agents have private information about their actions. Performance-based compensation provides significant incentives to executives. Performance is usually evaluated in a relatively effective and less costly way.

This dissertation draws attention to the influence of R&D intensity on incentive contracts brought about by the precision of performance measures. Performance measures in R&D intensive firms reflect less upon their intrinsic value, which is privately known. Prior studies argue that there should be decreasing weights on accounting returns in compensation schemes as a result of decreasing value-relevance of accounting earnings in R&D intensive firms (Anderson et al., 2000; Kole, 1997; Tolmor and Wallace, 1998; Kwon and Yin, 2006). They focus on the relation between accounting earnings and market value, while in this study I explain the precision of performance measure as the relation between performance measures (accounting earnings and stock price) and a firm's intrinsic value (the firm's future cash flows).

Consistent with prior studies which predict that accounting earnings have low relevance to market value in R&D intensive firms (Kole 1997; Kwon and Yin 2006), I also expect that accounting earnings reflect to a lesser degree the intrinsic value of the firms. Accounting numbers have low precision in R&D intensive firms because some intangible assets and related expenses are not recognized in financial statements under U.S. GAAP (Lev and Zarowin, 1999; Francis and Schipper, 1999; Collins et al., 1997). R&D intensive firms tend to incur greater long-term strategic expenses aimed at developing a competitive advantage. However, U.S. GAAP does not allow such expenses to be recognized as intangible assets. Therefore, in R&D intensive firms, accounting numbers are less relevant in measuring a firm's intrinsic value.

I also expect decreasing weights on the stock return, whereas most prior studies have found the opposite to be the case. Kwon and Yin (2006) find that the weights on stock return are higher in high-tech firms than in low-tech firms and that there are no significant differences among weights on accounting return. This is because greater reliance on market measures avoids the possibility of boosting accounting earnings by reducing R&D expenditures. Clinch (1991) documents that R&D intensive firms' compensation is more strongly aligned with both accounting-based and stock-based performance measures than non-R&D intensive firms in small firms. On the contrary, Bizjak et al. (1993) document a negative association between R&D intensity and executives' incentives which are measured by the estimated change of total compensation for every $1000 change in firm market value. Bizjak et al. (1993) argue that "an overemphasis on current stock price can induce managers with superior information to manipulate the market's expectations by making observable, though, suboptimal, investment choices."

Although stock prices immediately reflect market perceptions of R&D activities (Clinch 1991), the current market value of firms still is not the real value of firms because the investors do not have all the information that insiders have. Aboody and Lev (2000) have shown that insiders' trading gains more in R&D intensive firms than non-R&D intensive firms because high information asymmetry exists in the former. Aboody and Lev (2000) argue that information asymmetry is higher in R&D intensive firm because R&D activities are unique for each firm. It is difficult to deduce the value of an individual firm's R&D investments based on developments made by their competitors or other firms. Information asymmetry also rises because R&D intensive firms rarely share their technological details with the public. Furthermore, "while most physical and financial assets are traded in organized markets, where prices convey information about asset productivity and values, there are no organized markets for R&D and hence no asset prices from which to derive information" (Aboody and Lev, 2000). Market measures may not adquately reflect the real value of the firm, especially when proprietary information about managerial effort is directed at increasing firm value in the long run (Bushman et al., 1996).

This leads to my third hypothesis:

Hypothesis 3: The weights of compensation on financial performance measures decrease with R&D intensity.

Research Design:

To test my first two hypotheses, I specify the following OLS models.

$$(1)\ ln(TOTALPAY_{i,t}) = \beta_0 + \beta_1 RD_{i,t} + \beta_2 RET_{i,t} + \beta_3 RET_{i,t} * RD_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ROA_{i,t} * RD_{i,t} + \beta_6 TECHIE_{i,t} + \beta_7 TECHIE_{i,t} * RD_{i,t} + \beta_8 MBA_{i,t} + \beta_9 MBA_{i,t} * RD_{i,t} + \beta_{10} ln(Tenure\_CEO)_{i,t} + \beta_{11} ln(Tenure\_CEO_{i,t}) * RD + \beta_{12} MB_{i,t} + \beta_{13} ln(TA_{i,t}) + \varepsilon_{i,t}$$

$$(2)\ ln(TOTALPAY_{i,t}) = \beta_0 + \beta_1 RD_{i,t} + \beta_2 RET_{i,t} + \beta_3 RET_{i,t} * RD_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ROA_{i,t} * RD_{i,t} + \beta_6 SCIENCE_{i,t} + \beta_7 SCIENCE_{i,t} * RD_{i,t} + \beta_8 MBA_{i,t} + \beta_9 MBA_{i,t} * RD_{i,t} + \beta_{10} ln(Tenure\_CEO_{i,t}) + \beta_{11} ln(Tenure\_CEO_{i,t}) * RD_{i,t} + \beta_{12} MB_{i,t} + \beta_{13} ln(TA_{i,t}) + \varepsilon_{i,t}$$

$$(3)\ ln(TOTALPAY_{i,t}) = \beta_0 + \beta_1 RD_{i,t} + \beta_2 RET_{i,t} + \beta_3 RET_{i,t} * RD_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ROA_{i,t} * RD_{i,t} + \beta_6 PASTEXP_{i,t} + \beta_7 PASTEXP_{i,t} * RD_{i,t} + \beta_8 MBA_{i,t} + \beta_9 MBA_{i,t} * RD_{i,t} + \beta_{10} ln(Tenure\_CEO_{i,t}) + \beta_{11} ln(Tenure\_CEO_{i,t}) * RD_{i,t} + \beta_{12} MB_{i,t} + \beta_{13} ln(TA_{i,t}) + \varepsilon_{i,t}$$

The subscript *t* refers to the year and the subscript *i* refers to the firm. The definitions of the variable names are shown in Table 1. I conduct annual regressions to estimate the mean coefficients and Fama-MecBeth t-statistics. By running year-by-year regressions, I avoid serial correlation problems within my cross sectional data. I regress the logarithm transformation of CEOs' total compensation since the log transformation decreases the skewness of its distribution. *TOTALPAY* includes salary, bonuses, stock option, restricted stocks, and other long-term incentives. Stock options are valued by the Black-Scholes model. The log transformation of executives' compensation is commonly used in prior studies, such as Murphy (1985), Clinch (1991), Agarwal (1981), Gaver and Gaver (1993), Core et al. (1999), Boschen et al. 2003, and Duru et al. (2002).

To avoid the skewness of the R&D ratio, I employ the fractional rank of the R&D ratio. R&D is the fractional rank of a company's R&D expenditure to sales ratio. R&D rank is positively related to the R&D ratio and ranges between 0 and 1. Consistent with prior studies, I expect a positive sign for R&D intensity since managerial tasks in R&D intensive firms are more complex and challenging.

The signals of ability include *TECHIE*, *SCIENCE*, and *PASTEXP*. Functional backgrounds can signal the ability of CEOs who have accumulated and developed relevant expertise. Candidates with technical work experience are more likely to be chosen as a CEO in high R&D intensive firms (Datta and Guthrie, 1994). I use the variable *TECHIE* to proxy for the technical background of executives, which is a dummy variable that equals 1 if the CEO has ever worked as a scientist or engineer in an industry-related area. Education is one of the observable human capital measures: I use whether the CEO has a degree in science or engineering. Relevant past experience can also be a signal of managerial ability because these past experiences may be positively correlated with managerial ability. PASTEXP is defined by whether an executive has previously worked in related R&D intensive industries. Consistent with my first hypothesis, I expect positive coefficients on the interaction terms of TECHIE*R&D, SCIENCE*R&D, and PASTEXP*R&D.

I expect negative coefficients on the interaction terms of MBA with R&D since an MBA provides general administrative skills that are not particularly helpful in R&D intensive firms. Consistent with Murphy and Zabojnik (2007), the expected sign for MBA is positive since executives with an MBA degree usually have higher level of administrative skills in general. I have a negative sign for the interaction of CEO tenure and R&D since long-tenured executives may be lacking a degree of creativity. The expected sign for CEO tenure is positive since the influence of CEOs and the firm-specific skills increase with time.

I use both accounting earnings (ROA) and stock return (RET) to evaluate executives' performance. Consistent with prior studies, I expect significant positive relations between performance measures and executive compensation. Both accounting measures and market measures have been shown to be positively correlated with executive compensation (Lambert and Larcker, 1987; Sloan, 1993). "Price and earnings are alternative imperfect measures of total firm output" as argued in Bushman and Indjejikian (1993). On the one hand, market measures have some advantage in capturing managerial effort. Market measures incorporate accounting earnings and other information expected by investors (Bushman and Indjejikian, 1993), while accounting earnings can not reflect the long-term impact of executives' current actions on firms' value. On the other hand, accounting numbers are more controllable with executives' actions than stock returns. For instance, many economic events and market factors which affect stock returns generally cannot be controlled by the actions of the executives. It can be argued that stock measures are more volatile than accounting earnings since they are more subject to speculative behavior and exogenous impact. As they are easily evaluated and not very costly to principals, both of the performance measures are contract-relevant.

I also control for growth (MB) and size (TA) effect. Market-to-book ratio is a proxy for companies' growth prospect. It is commonly found in prior studies that the larger the company, the higher the compensation paid to the CEO. I use the logarithm of total assets to proxy size effect on compensation.

I next consider the following models:

$$(4)\ ln(TOTALPAY_{i,t}) = \beta_0 + \beta_1 RD_{i,t} + \beta_2 RET_{i,t} + \beta_3 RET_{i,t} * RD_{i,t} + \beta_4 RET_{i,t} * Noise\_RET_{i,t} + \beta_5 ROA_{i,t} + \beta_6 ROA_{i,t} * RD_{i,t} + \beta_7 ROA_{i,t} * Noise\_RET_{i,t} + \beta_8 TECHIE_{i,t} + \beta_9 TECHIE_{i,t} * RD_{i,t} + \beta_{10} MBA_{i,t} + \beta_{11} MBA_{i,t} * RD_{i,t} + \beta_{12} ln(Tenure\_CEO_{i,t}) + \beta_{13} ln(Tenure\_CEO_{i,t}) * RD_{i,t} + \beta_{14} MB_{i,t} + \beta_{15} ln(TA_{i,t}) + \beta_{16} Noise\_RET_{i,t} + \beta_{17} Noise\_ROA_{i,t} + \varepsilon_{i,t}$$

$$(5)\ ln(TOTALPAY_{i,t}) = \beta_0 + \beta_1 RD_{i,t} + \beta_2 RET_{i,t} + \beta_3 RET_{i,t} * RD_{i,t} + \beta_4 RET_{i,t} * Noise\_RET_{i,t} + \beta_5 ROA_{i,t} + \beta_6 ROA_{i,t} * RD_{i,t} + \beta_7 ROA_{i,t} * Noise\_RET_{i,t} + \beta_8 SCIENCE_{i,t} + \beta_9 SCIENCE_{i,t} * RD_{i,t} + \beta_{10} MBA_{i,t} + \beta_{11} MBA_{i,t} * RD_{i,t} + \beta_{12} ln(Tenure\_CEO_{i,t}) + \beta_{13} ln(Tenure\_CEO_{i,t}) * RD_{i,t} + \beta_{14} MB_{i,t} + \beta_{15} ln(TA_{i,t}) + \beta_{16} Noise\_RET_{i,t} + \beta_{17} Noise\_ROA_{i,t} + \varepsilon_{i,t}$$

$$(6)\ ln(TOTALPAY_{i,t}) = \beta_0 + \beta_1 RD_{i,t} + \beta_2 RET_{i,t} + \beta_3 RET_{i,t} * RD_{i,t} + \beta_4 RET_{i,t} * Noise\_RET_{i,t} + \beta_5 ROA_{i,t} + \beta_6 ROA_{i,t} * RD_{i,t} + \beta_7 ROA_{i,t} * Noise\_RET_{i,t} + \beta_8 PASTEXP_{i,t} + \beta_9 PASTEXP_{i,t} * RD_{i,t} + \beta_{10} MBA_{i,t} + \beta_{11} MBA_{i,t} * RD_{i,t} + \beta_{12} ln(Tenure\_CEO_{i,t}) + \beta_{13} ln(Tenure\_CEO_{i,t}) * RD_{i,t} + \beta_{14} MB_{i,t} + \beta_{15} ln(TA_{i,t}) + \beta_{16} Noise\_RET_{i,t} + \beta_{17} Noise\_ROA_{i,t} + \varepsilon_{i,t}$$

In equations (4)—(6), I add the time-series variances of performance measures and their interaction with R&D intensity. Moral hazard theory suggests that pay-for-performance sensitivity depends on the informational value a financial performance measure provides with respect to the agent's effort (Holmstrom, 1979; Holmstom and Milgrom, 1987). Banker and Datar (1989) demonstrate that the relative weight assigned a performance measure decreases with its variance. The noisier a performance measure, the less information it conveys about the agent's effort. Consistent with moral hazard theory, a number of empirical studies document that the relative weights on accounting earnings and stock returns are negatively associated with their relative variances (Lambert and Larcker, 1987; Sloan, 1993; Bushman et al, 1996; Indjejikian and Nanda, 2002). Thus, the expected signs for ROA*Noise_ROA and RET*Noise_RET are negative. At the same time, the expected signs are positive for the noise measures (Noise_ROA and Noise_RET) because agents are risk-averse and must thereby be compensated for taking greater risks. By controlling for the effects of the variance of performance measures, I also explain that the decreasing weights on performance measures in R&D intensive firms do not arise from the more volatile financial performance of these firms.

Sample Selection

I obtained CEO compensation data from ExecuComp. I then merged it with Compustat and CRSP data. I deleted the following observations: (1) those that have CEO changes during the year, (2) those whose book value of total equity is negative, and (3) firms in the financial industry. I have 18,357 observations with available financial data. Then I hand-collected personal data about CEOs from their biographies available in

Marquis Who's Who database, such as their technical work experience and if they have an MBA degree. Finally, my sample include 1820 CEOs from 1102 firms (9,368 firm-year observations) with personal data available, covering 1992 to 2006. To remove the effects of outliers, I winsorize all the continuous variables at the 1% and 99% levels.

Table 2 shows the descriptive statistics for my sample. The mean and median of CEOs' total compensation are $5.31 million and $2.51 million respectively. The logarithm of total compensation has a mean of 7.697 and a median of 7.672. After the log transformation, the distribution of total compensation is less skewed. The ratio of R&D expenditure to sales has a mean of 6.6%. I set the missing R&D expenditure as 0; approximately 50% of my sample has zero R&D ratios. The mean and median of R&D rank are 0.626 and 0.529, respectively. Over the past two decades, R&D expenditures have grown rapidly, especially in high technology industries. The mean of R&D expenditures has grown from $211 million in 1992 to $338 million in 2006. The ratio of R&D expenditure to sales grew similarly from 3.39% to 5.64%. The means of ROA and RET are 5.1% and 19.5%. The mean of MB is 3.412. The mean of log(TA) is 7.585, which indicates that the size of my sample is similar to the population of COMPUSTAT firms. 10.2% of CEOs have technical work experience, and 7.9% of CEOs have a degree in science or engineering, and 4.7% of CEOs have worked in relevant R&D intensive industries. 29.5% of CEOs hold an MBA degree. They have worked as CEOs for 10 years on average. Table 3 shows the mean of the R&D intensity in every Fama-French industry. There are seven industries that have an average of R&D rank more than 0.684 and an average of R&D ratio more than 0.07: Recreational Products, Medical Equipment, Pharmaceutical Products, Computers, Business Service, Electronic Equipment, Measuring and Control Equipment.

Table 4 presents the Pearson correlation coefficients of my sample. The highest correlation of 0.885 is that between TECHIE and SCIENCE, which means those with technical work experience most likely majored in science or engineering. To avoid multi-collinearity problems, I do not include these two variables in one regression model. I use them alternately in my model to measure the managerial ability of CEOs. The second highest correlation of 0.599 is that between Ln(TA) and Ln(TOTALPAY), indicating that executive compensation is greater in larger firms. The correlation between Noise_ROA and Nosie_RET is 0.532, showing that firms with unstable accounting earnings have greater stock price volatility. The correlation between MB and ROA is 0.381. The correlation between R&D and noise_ROA is 0.363, and the correlation between R&D and noise_RET is 0.198. This shows that the volatility of accounting earnings is strongly correlated with R&D intensity and that stock price volatility is also positively correlated with R&D intensity. All other correlation coefficients are below 0.3.

Empirical Results

Table 5 presents the Fama-MacBeth regression results for models (1) to (3). The results provide supportive evidence for each of my three hypotheses. The first column of Table 3 presents the results for model (1), which shows that the mean coefficients on TECHIE*R&D are 0.397 and Fama-MecBeth t-statistics is 2.24 ($p<0.05$). The mean coefficients on SCIENCE*R&D, shown in the second column, are also positive and significant. In the third column, the mean coefficients on SCIENCE*R&D are insignificant. This provides supportive evidence for my first hypothesis—R&D intensive firms offer a premium to CEOs with technical work experience or with a science/engineering major. The results for MBA*R&D for all three models are negative and significant, which provides support for my second hypothesis. R&D intensive firms do not value an MBA degree for their CEOs. The results show that the mean coefficient for tenure*R&D is negative and significant, in agreement with my hypothesis that newness is desired. The coefficients on the interaction terms RET*R&D and ROA*R&D are negatively significant for all three models. The model (1) results for RET*R&D and ROA*R&D are -0.411 (Fama-MecBeth t-statistics, -2.229) and -7.128 (Fama-MecBeth t-statistics, -3.167). This is consistent with my third hypothesis: weights on financial performance measures decrease with R&D intensity. The coefficients on R&D are positive and significant. Additionally the marginal effect of R&D at the mean of RET and ROA is positive and significant (mean coefficients 2.101, Fama MecBeth t-statistics 2.718). CEOs are rewarded more in R&D intensive firms than non-R&D intensive firms, which is consistent with Clinch (2001) and Kwon and Yin (2006). The total compensation also increases with market to book ratio (MB) and size (TA).

Table 6 presents the Fama-MacBeth regression results after controlling for the variances of financial performance measures and their interaction with R&D intensity. By including these variables, I show that decreasing weights on performance measures in R&D intensive firms are still significant after controlling the volatility of performance measures. This sample is smaller than the sample in table 5 because I require at least 5 observations from each firm to calculate the time-series variance of performance measures (Noise_ROA, Noise_RET). Consistent with prior findings, I get negative and significant coefficients on the two interaction terms ROA* Noise_ROA and RET*

Noise_RET. The high volatility of performance measures means that these performance measures are impacted largely by random shock beyond CEOs' controls. If managers' efforts are hardly evaluated by financial performance measures, the weights on financial performance measures should be attenuated (Banker and Datar 1989). Lambert and Larcker (1987) find that weights on financial performance measures are related to the variances of these measures. I also get positive coefficients on Noise_ROA and Noise_RET themselves. As argued by Core et al (1999): "Firm risk, both as a measure of the firm's information environment and the risk of its operating environment, is also a potentially important determinant of the level of CEO compensation." Cyert et al. (1997) find that CEO compensation is higher in firms with greater stock return volatility. Smith and Watts (1992) elaborate: "If the principal cannot observe the agents' actions, the optimal contract gives the agent a share in the outcome of his actions. That contract provides an incentive to expend effort to achieve the principal's objective, thus justify the increased compensation of the agent for bearing the additional risk." Other results are as similar as the results in table 5.

Robustness Tests

In non-tabulated tests, the results are similar when the R&D ratio is R&D expenditure scaled by total assets instead of sales. The results are qualitatively similar when R&D intensity (rank) is replaced with a R&D dummy variable. I tried different cutoff points to define the R&D dummy variable (the cutoff points are R&D ratio equals 0, or 0.05, or 0.08.). The results are robust to all of the different dummy R&D variables. The results are similar when total compensation is replaced with total cash compensation. The results are similar after I change the definition for MBA dummy. For example, I use dummy variables whether the CEO has an MBA from a top 50 business school (or top 20, top 30 business school); while in the main regressions I use a dummy variable whether the CEO has an MBA from any business school. The results are robust by replacing ROA with ROE. I also get qualitatively similar results by replacing tenure as the CEO with tenure in the firm. Since tenure as CEO is highly correlated with tenure in the firm, I do not include the two variables in one model.

Comparison with prior studies

There are many studies that investigate the impact of R&D intensity on total executive compensation. There are two main findings of studies in this particular area. First, they argue higher pay should be paid in R&D intensive firms because of the increasing difficulty of managerial tasks (Smith and Watts 1992). Smith and Watts (1992) argue that "I hypothesize that the marginal product of investment decision makers is greater than the marginal product of supervisors and good decision makers are less numerous than good supervisors. Therefore, the larger the proportion of firm value represented by growth options, the greater the manger's compensation". Consistent with prior studies, I also find total compensation is positively related with R&D intensity.

Second, they examine how incentive contracts avoid the myopic behaviors of managers (Dechow and Sloan 1991; Duru et al. 2002; Cheng 2004). After Dechow and Sloan (1991), who first investigated the horizon problem of executives, many studies examine how the incentive contracts are structured to reduce opportunistic behavior of managers (Duru et al. 2002; Cheng 2004). Duru et al. (2002) document that executives are rewarded on earnings prior to R&D expenditures rather than earnings after them. This indicates that the compensation committee "shields" executives from R&D expenditures.

Cheng (2004) documents a positive relation between the change of R&D expenditure and the change of stock option grants.

Kole (1997) and Smith and Watts (1992) show that R&D intensive firms use the greater amount of stock option grant to their CEOs. This next theory which states that executive compensation that grants more stock options can alleviate managerial myopic behavior is quite similar to the theory above. Consistent with these two studies, in Table 7, I also find a positive relation between the proportion of equity pay in the total compensation and R&D intensity, indicating that R&D intensive firms have more long-term market-based incentives than short-term market-based and accounting-based compensation. This may be due to that it takes a while for investors in the capital markets to recognize the value of R&D.

Baber et al. (1996) document that the change of total compensation is more related to stock return in firms with high investment opportunities than those with low investment opportunities. And Kwon and Yin (2006) find that the change of total compensation is more related to stock return in high-tech industries than low-tech industries. As both high investment opportunities and high technology are highly correlated to R&D intensity, I replicate the models in these two studies and find similar results, as shown in table 8. However, the change model is not proper for my study because it does not explain the effect of human capital measures on the total compensation. I use the level of total compensation and Fama-MacBeth regressions to investigate how R&D intensity impacts the association between the human capital measures and total executive compensation. My finding is that weights placed on stock returns in executive compensation contracts also decrease with R&D intensity. This is due to fact that the market value of R&D intensive firms reflects their intrinsic value less.

CHAPTER 4

THE COMPENSATION OF UNIVERSITY PRESIDENTS

Empirical Hypotheses

The compensation of university presidents provides an appropriate empirical context within which to interpret the predictions of my analytical model. Presidential activities are hard to monitor and measure because the responsibilities of presidents have no clear boundaries and the objectives of universities are diverse (Dunn et al., 1985; Cote, 1985). Cote (1985) presents eighteen categories of a university president's duties, which include acting as the university's ceremonial official, chief administrator, government liaison, long-range planner, significant fund raiser, financial manager, academic planner, and resource stimulator. Alpert (1985) argues that the president's role is less accountable to external sponsors because the responsibilities of university president are ambiguous. For example, Alpert (1985) states: "As chief spokesperson for their universities, presidents are prominent in searching for funds; as chief budgetary officers, they are responsible for keeping the books balanced. The president is also expected to provide the necessary coordination between departmental and institutional goals and to balance the educational, public service, and research functions of the campus." Although their resources and capabilities are remarkably limited, university presidents are responsible for "everything." Furthermore, the priorities of each role differ because objectives among higher education institutions are varied, such as the necessity to produce high quality graduates or having to conduct innovative research (Baldridge et al., 1978). Thus, since presidential roles are not routine, are challenging to monitor, and widely vary among universities, it is clear that the responsibilities of presidents are subject to severe agency problems.

Given that the performance and tasks of university presidents are difficult to measure and define, the compensation of university presidents should depend less heavily on performance measures and more heavily on ability measures, such that they may serve as a tool by which to screen candidates, as is argued by adverse selection theory. Managerial compensation is associated with signals that are informative regarding the capability of agents to manage an organization, since principals cannot observe the ability of agents directly (Spence, 1973). According to human capital theory, human capital investments accumulate managerial skills (Becker, 1964, 1975). Managerial ability can be signaled by human capital measures such as experience, background, and education because individuals may acquire managerial skills from them. Managers learn and perfect their skills through prior work experience and education. Along these lines, I empirically assess the ability of university presidents by using measures of their experience, academic and administration backgrounds, having held a prior presidency, and formal education. Due to the adverse selection problem, the total compensation of the agents increase in their ability due to the informational rent they earn.

I state my fourth hypothesis as follows:

Hypothesis 4: The compensation of a university president is positively associated with measures of the president's ability.

Performance in a previous position is used by a principal to formulate and update their beliefs about an agent's true ability. That is, past performance can signal an agent's unobservable ability, helping to resolve adverse selection problems (Murphy, 1986;

Holmstrom, 1999; Agarwal et al., 2009; Banker and Hwang, 2008). Murphy (1986) and Holmstrom (1999) argue that managerial ability is partly revealed by observing managerial productivity. Two recent papers provide evidence to support this theory. Banker and Hwang (2008) find that the past performance of e-service providers provides a signal of their current quality and thus influences the price of their service. Agarwal et al. (2009) show that hedge fund investors rely on past performance to infer managerial ability because portfolio holdings have limited disclosure information. It follows that pay should be positively associated with past performance because past performance is informative about the agent's ability. For presidents with prior positions as university presidents, I use the stature and size (which are measures of organizational complexity) of their past university to proxy for their past performance. This leads to my fifth hypothesis:

Hypothesis 5: For presidents with prior positions as university presidents, their compensation is positively associated with the stature and size of their prior university.

Performance-based compensation enhances congruence in the goals of agents and principals. This motivates agents to exert effort that improves the outcomes of interest to the principals they represent (Holmstrom, 1979; Banker and Datar, 1989; Bushman and Indjejikian, 1993; Feltham and Xie, 1994; Datar et al., 2001). Moral hazard theory predicts that pay should increase with better performance (Larcker, 1983; Murphy, 1985; Sloan 1993). Accordingly, in the executive compensation literature, there is extensive evidence that CEOs are rewarded contingent on various performance measures, such as accounting and market measures (e.g., Healy, 1985; Lambert and Larcker, 1987; Sloan, 1993; Bushman et al., 1996; Ittner et al., 1997).

For university presidents, performance-based pay is difficult, but not impossible, to implement. In light of my discussion concerning the wide span and breadth of roles played by a university president, I postulate that changes in the size and stature of the university under the president's purview are reasonable measures of the president's performance.

Much evidence suggests that CEO compensation is positively associated with organizational complexity, such as firm size (Harris and Helfat, 1997; Ciscel and Carroll, 1980; Finkelstein and Hambrick, 1989a; McGuire et al., 1975; Lambert et al., 1991; O'Reilly et al., 1988). As a result, empirical studies of executive compensation typically include firm size as a control variable (Smith and Watts, 1992; Gaver and Gaver, 1993, 1995; Gaver et al., 1995; Rose and Shepard, 1997; Henderson and Fredrickson, 1996). Firm diversification also reflects the organizational complexity of a firm (Finkelstein and Hambrick, 1989b; Nagar et al., 2003). Numerous empirical studies have documented a positive relation between executive compensation and firm diversification (Rose and Shepard, 1997; Agrawal and Knoeber, 1998; Sanders and Carpenter, 1998; Almazan et al., 2005; Anderson et al., 2000).

The positive association between executive compensation and organizational complexity has been commonly attributed to the premise that CEOs of more complex firms should be compensated to a greater degree for exerting higher effort. Various rationales have been proposed in favor of this argument. Large firms have more complex structures, thereby requiring a higher level of managerial effort (Nwaeze et al., 2006). Executives in larger firms are paid higher levels of compensation because the larger the scope of operations, the greater the demands on top executives (Gaver and Gaver, 1993, 1995). Agarwal (1981) suggests that the larger is the firm's size, the higher is the marginal productivity of its CEO; hence, CEOs in larger firms should be paid more. Larger firms have a greater stock of resources and assets that are affected by managerial decisions; thus, managers of larger firms have a higher value added and should thereby be compensated to a greater degree (Smith and Watts, 1992; Baker and Hall, 2004).

However, including measures of organizational complexity as control variables does not capture role of managerial effort. If CEOs of more complex firms are compensated to a greater degree for exerting higher effort, then this should be reflected in their pay-performance sensitivity. Performance-based compensation is the means by which to elicit high effort (Gaver and Gaver, 1993, 1995; Gaver et al., 1995; Smith and Watts, 1992; Demsetz and Lehn, 1985; Nwaeze et al., 2006). The implication is that, if effort is the driving force, then the CEOs of more complex firms should receive higher pay via incentive compensation. Including measures of organizational complexity as control variables in a regression of executive compensation presumes that the effect of organizational complexity operates via the fixed component of compensation. It follows that including measures of organizational complexity as control variables is not the appropriate empirical methodology by which to account for the role of moral hazard. Instead, to test the hypothesis that CEOs of more complex firms are compensated to a greater degree for exerting higher effort, measures of organizational complexity (such as the firm's size and extent of diversification) should be interacted with performance measures.

If the sensitivity of the outcome to effort is decreasing in organizational complexity (i.e., it is more difficult to improve the performance of a university with high stature and/or large enrollment), then the agent's optimal pay-performance sensitivity is decreasing in organizational complexity; and if the sensitivity of the outcome to effort is increasing in organizational complexity (i.e., the marginal productivity of a president is enhanced at a university with high stature and/or large enrollment), then the agent's optimal pay-performance sensitivity is increasing in organizational complexity.

Therefore, from an empirical standpoint, to capture the role of presidential effort, the measures of organizational complexity should be interacted with the performance measures, i.e. changes in the size and stature of the university. If these interaction terms are found to be significantly different from zero, then this is evidence that the role of presidential effort explains (at least in part) the impact of the organizational complexity on the president's compensation. If the interaction terms are found to be significantly negative, then this suggests it is more difficult for a president to increase the stature and size of a more complex university. If the interaction terms are found to be significantly positive, then this suggests that presidential effort has a greater impact on the stature and size of a more complex university.

The competing explanation I propose is that the compensation of university presidents is driven by the role of ability, as opposed to effort. Furthermore, incorporating the role of ability validates including measures of organizational complexity as control variables, as is commonly practiced in empirical studies of executive compensation.

I state my sixth hypothesis as follows:

Hypothesis 6a: The pay-performance sensitivity of a university president is unrelated to the university's complexity.

Hypothesis 6b: The pay-performance sensitivity of a university president is positively *related to the university's complexity.*

Hypothesis 6c: The pay-performance sensitivity of a university president is negatively related to the university's complexity.

By virtue of the interviewing process and via social networking in academic and non-academic circles, trustees observe a signal of the candidate's ability along with desirable personality traits that in combination go beyond traditional human capital measures. June and Ashburn (2007) summarized four qualities of university presidents that can influence a board's decision in setting compensation: general administrative ability, proven fund raising skills, effectiveness in a crisis, and national reputation. The authors cited a description of general administrative ability from Aniello A. Bianco, chairman of the Board of Trustees at Pace University: "The ability to set priorities, establish strategic objectives, and then get faculty members, students, and other administrators to back the plans can't be overrated;" and "You've got to be able to understand what's going on, do the things that are right, and discontinue the things that are wrong in a way that is acceptable to all the constituencies of the university." University presidents would not get such a position unless they are qualified candidates. If the selection process is optimal, high ability candidates will match with such complex jobs. In that spirit, Abdel-khalik (2003) argues that the managerial ability of agents can be described by their job duties.

Although I do not have access to the information that is used by university interviewers to evaluate the ability of presidential candidates, I can judge the unobservable ability and desirable personality traits of presidents based on the complexity of the universities they lead. The complexity of a university is associated with the difficulty of the president's duties and hence points to the president's ability to manage the intricacies of a higher-education institution. Abrahamson (1973) argued that a president's responsibilities are more challenging when the university is of high academic standing and has missions that are more diverse. In other words, job responsibilities of presidents are more demanding with increasing complexity of the university. I measure the complexity of the university by its stature and enrollment. The university stature is a factor of freshman SAT scores, professor salary levels, tuition, endowment. I hypothesize that presidents of highly regarded universities have a more difficult task of maintaining the quality of students and faculty and a high level of funding resources. Universities must provide a high quality education in order to maintain a high degree of selectivity with freshmen. Appealing academic research environments are necessary in order to attract and retain renowned professors. A large institution is often more difficult to manage than a small institution because of resource allocation, coordination among different departments and recruitment of students and faculty. Therefore, universities with a heightened stature and enrollment require higher ability presidents with superior personality traits and fit for the position to fulfill their duties. Greater compensation is required to attract such talented individuals; indeed, Agarwal (1981) argues that higher compensation is awarded for more complex job duties.

I state my seventh hypothesis as follows:

Hypothesis 7: The compensation of a university president is positively associated with the university's complexity.

Estimation Models

I use the following model to test Hypotheses 4 and 7:

$$
\begin{aligned}
(7)\quad & Total\_Pay_{i,t} = \beta_0 + \beta_1 Factor(University\_Stature)_{i,t-1} + \beta_2 Enrollment_{i,t-1} + \\
& \beta_3 Factor(Experience)_{i,t-1} + \beta_4 Academic\_Background_i + \beta_5 Administration\_Background_i + \\
& \beta_6 Prior\_Presidency_i + \beta_7 JD\_Degree_i + \beta_8 Male\_Gender_i + \varepsilon_{i,t}
\end{aligned}
$$

The subscript *i* refers to the president and *t* refers to the year. Because compensation decisions are made in the spring or summer of the preceding academic year, I use independent variables of the previous academic year. See Table 1 for the variable definitions.

I adopt three dimensions of ability for university presidents, which in turn yield five variables by which to measure managerial ability: experience, background, and education. These dimensions are commonly used in the literature on human capital. Abdel-khalik (2003) argues that human capital, which is defined by Topel (2000) as the skills embodied in people, can proxy for the abilities of managers to some extent. The human capital literature provides evidence that pay increases with work experience, relevant background, and educational level attained (Juhn et al., 1993; Katz and Murphy, 1992).

Work experience can illustrate the ability of university presidents because prior studies show that managerial skills accumulate with work experience (Haley, 1973; Holmstrom, 1999; Murphy and Welch, 1992). My experience variables include *Working Years, President Tenure, University Tenure*, and *Age*. From these four variables I construct the factor *Factor(Experience)*, in a manner explained below, for which I expect a positive sign. I include both measures of tenure because general work experience and work experience specific to the position are meaningful in the development of managerial skills. Some experience, which cannot be captured by working years, is measured by age. Experience typically increases with age under the human capital argument. These forms of experience help university presidents manage their complex work load and resolve crises.

The background of an agent is an indicator of abilities that are useful to the principal in predicting future performance (Hogan and McPheters, 1980; Murphy and Welch, 1992). Stern (1990) analytically shows that wages depend on characteristics of the worker's past job history. I use three dummy variables to proxy for the president's background: *Administration, Academic*, and *Prior Presidency*. *Administration* is a dummy for having an educational administration background. *Academic* is a dummy for being a tenured professor, which is included because it may be important in the establishment of authority: presidents with a solid academic reputation may attract high quality professors. I expect that presidents with prior presidency experience have higher compensation than those hired from within the university because they not only have a more experienced background and a better reputation, but also have more bargaining power.

One important indicator of human capital is education (Murphy and Welch, 1992). Hambrick and Manson (1984) propose that the innovation of a management team is associated with the amount and type of formal education. I include the dummy variable *JD*, which equals one for those having a JD degree, to take into account the impact of a legal background on compensation. Presidents with a JD degree will be more successful in resolving legal issues, which are an important part of a university president's job function, so having a JD degree is regarded as a measure of ability. Furthermore, presidents with a JD degree generally have worked as lawyers, and the legal profession ranks among the highest paying careers, implying their alternative opportunities are highly paid. Thus, for both these reasons, I expect that presidents with a JD degree are compensated more than those without a JD degree.

To summarize, I have five variables by which to measure ability: *Factor(Experience), Administration, Academic*, *Prior Presidency*, and *JD*. I expect all five measures to have positive effects on the total compensation of university presidents.

I have two measures to proxy for organizational complexity: university stature and enrollment. First, I employ four measures of university stature: the quality of enrolled students, quality of professors, tuition, and size of the endowment. From these four variables I construct the factor *Factor(University Stature)*, in a manner explained below, for which I expect a positive sign. Overall, a university president's job is more challenging, difficult, and complex when the university is renowned for its reputation. Universities with superior reputations are more complicated to manage because their presidents need to maintain the quality of students and professors at high levels, as well as sustain funding. Dunn et al. (1985) argue that "Society looks to the university to transmit cultural and social values … At a more pragmatic level, the university must attract quality faculty and students and in a time of scarcity must continuously seek to maintain and expand its source of funding." I use freshman SAT scores to represent the quality of students. Universities with an excellent reputation attract more students with high SAT scores than those with a relatively average reputation (Tang et al., 2000). Meanwhile, attracting high quality students is one way to improve the university's reputation. It is also one of the basic responsibilities of the president. Following Ehrenberg et al. (2001), my first measure of university stature is the average of the 25th and 75th percentiles for verbal scores and the average of math scores.[1]

The salaries of professors in a university are related to their merit (Alexander, 2001). A high salary is necessary to attract and retain professors with superior reputations.

[1]I transform ACT scores into SAT scores for those universities that report freshman ACT scores.

Universities with prestigious professors can provide students more guidance and training in both professional and research programs. Professors contribute to enhance the institution's reputation, improve research creativity and productivity, and induce the acquisition of scarce resources (Gomez-Mejia and Balkin, 1992). Thus, my second measure of university stature is the average salary of professors of all ranks to proxy for their quality.

My third measure of university stature is the university's average tuition for a full-time, undergraduate, in-state student per academic year.[2] Tang et al. (2004) argue that universities that charge high tuition may have a better academic reputation and ranking than those that charge low tuition. Top-ranked universities charge a high tuition, which presumably provide high quality of service to their students. Usually, tuition is positively associated with the university's reputation and it is one source of the university's finance.

Another source of finance is the university's endowment, measured by the endowment's market value per student, which is my fourth measure of university stature. Funding resources such as endowments are necessary to support the everyday operations and research objectives of a university. A president is responsible for attracting more funding. As reported by June and Ashburn in the Chronicle of Higher Education (2007), "proven fund raiser" is one of the qualifications assuring that boards offer a president higher pay.

The enrollment, which is measured by the number of equivalent full-time students, is also a proxy for organizational complexity. To compare with prior studies, I include enrollment as a separate variable instead of building in the above university stature factor.

[2] I use in-state tuition rates because out-of-state tuition rates are not available for over 50% of my sample.

The enrollment is used to proxy for the traditional size effect which is a control variable in most of prior studies. Cote (1985) reports that the role of a university president as an educational advocate and government liaison/resource stimulator is more important as institutional size increases. Hence, I expect a positive sign for *Enrollment*.

I control for the effect of gender on a president's compensation, which has been shown to have a significant impact on their compensation in the academic arena (Monks and McGoldrick, 2004; Pfeffer and Ross, 1990). The dummy *Gender* equals 1 for a male. Consistent with prior studies, I expect a negative effect on compensation for female presidents.

I use the following models to test Hypotheses 6:

$$\begin{aligned}(8)\quad & Total\_Pay_{i,t} = \beta_0 + \beta_1 Factor(University\_Stature)_{i,t-1} + \beta_2 Enrollment_{i,t-1} + \\ & \beta_3 Factor(Experience)_{i,t-1} + \beta_4 Academic\_Background_i + \\ & \beta_5 Administration\_Background_i + \beta_6 Prior\_Presidency_i + \beta_7 JD\_Degree_i + \\ & \beta_8 Male\_Gender_i + \beta_9 Growth\_Enrollment_{i,t} + \\ & \beta_{10} Growth\_University\_Stature_{i,t} + \varepsilon_{i,t}\end{aligned}$$

$$\begin{aligned}(9)\quad & Total\_Pay_{i,t} = \beta_0 + \beta_1 Factor(University\_Stature)_{i,t-1} + \beta_2 Enrollment_{i,t-1} + \\ & \beta_3 Factor(Experience)_{i,t-1} + \beta_4 Academic\_Background_i + \\ & \beta_5 \text{Administration}\_Background_i + \beta_6 \text{Prior\_Presidency}_i + \beta_7 JD\_Degree_i + \\ & \beta_8 Male\_Gender_i + \beta_9 Growth\_Enrollment_{i,t} + \\ & \beta_{10} Growth\_Enrollment_{i,t} * Factor(University\_Stature)_{i,t-1} + \\ & \beta_{11} Growth\_University\_Stature_{i,t} + \\ & \beta_{12} Growth\_University\_Stature_{i,t} * Factor(University\_Stature)_{i,t-1} + \varepsilon_{i,t}\end{aligned}$$

$$\begin{aligned}(10)\quad & Total\_Pay_{i,t} = \beta_0 + \beta_1 Factor(University\_Stature)_{i,t-1} + \beta_2 Enrollment_{i,t-1} + \\ & \beta_3 Factor(Experience)_{i,t-1} + \beta_4 Academic\_Background_i + \\ & \beta_5 \text{Administration}\_Background_i + \beta_6 \text{Prior\_Presidency}_i + \beta_7 JD\_Degree_i + \\ & \beta_8 Male\_Gender_i + \beta_9 Growth\_Enrollment_{i,t} + \\ & \beta_{10} Growth\_Enrollment_{i,t} * Factor(University\_Stature)_{i,t-1} + \\ & \beta_{11} Growth\_Enrollment_{i,t} * Enrollment_{i,t-1} + \\ & \beta_{12} Growth\_University\_Stature_{i,t} + \\ & \beta_{13} Growth\_University\_Stature_{i,t} * Factor(University\_Stature)_{i,t-1} + \\ & \beta_{13} Growth\_University\_Stature_{i,t} * Enrollment_{i,t-1} + \varepsilon_{i,t}\end{aligned}$$

I employ the contemporaneous percent changes in the university's enrollment and stature as performance measures. In non-tabulated robustness tests, I instead include the percent changes in the university's enrollment and stature of the previous year, yielding similar results to those reported here. The presumption is that these performance measures convey information regarding presidential effort. Hypothesis 6 relates to the interaction between the university's complexity and the two performance measures. Hypothesis 6a posits that the interaction terms are insignificant, Hypothesis 6b that they are positive, and Hypothesis 6c that they are negative.

To test Hypothesis 5, I estimate the following models for presidents having held a presidential position at a previous university:

$$\begin{aligned}(11)\quad & Total\_Pay_{i,t} = \beta_0 + \beta_1 Factor(Prior\_University\_Stature)_i + \\ & \beta_2 Prior\_University\_Enrollment_i + \beta_3 Factor(Present\_University\_Stature)_{i,t-1} + \\ & \beta_4 Present\_University\_Enrollment_{i,t-1} + \beta_5 Factor(Experience)_{i,t-1} + \beta_6 Academic\_Background_i + \\ & \beta_7 Administration\_Background_i + \beta_8 JD\_Degree_i + \beta_9 Male\_Gender_i + \varepsilon_{i,t}\end{aligned}$$

$$\begin{aligned}(12)\quad & Total\_Pay_{i,t} = \beta_0 + \beta_1 Factor(Prior\_University\_Stature)_i + \\ & \beta_2 Prior\_University\_Enrollment_i + \beta_3 Factor(Present\_University\_Stature)_{i,t-1} + \\ & \beta_4 Present\_University\_Enrollment_{i,t-1} + \beta_5 Factor(Experience)_{i,t-1} + \\ & \beta_6 Academic\_Background_i + \beta_7 Administration\_Background_{i\,i} + \beta_8 JD\_Degree_i + \\ & \beta_9 Male\_Gender_i + \beta_{10} Growth\_Enrollment_{i,t} + \beta_{11} Growth\_University\_Stature_{i,t} + \varepsilon_{i,t}\end{aligned}$$

$$\begin{aligned}(13)\quad & Total\_Pay_{i,t} = \beta_0 + \beta_1 Factor(\mathrm{Pr}ior\_University\_Stature)_i + \\ & \beta_2 Prior\_University\_Enrollment_i + \beta_3 Factor(\mathrm{Pr}esent\_University\_Stature)_{i,t-1} + \\ & \beta_4 Present\_University\_Enrollment_{i,t-1} + \beta_5 Factor(Experience)_{i,t-1} + \beta_6 Academic\_Background_i + \\ & \beta_7 Administration\_Background_i + \beta_8 JD\_Degree_i + \beta_9 Gender_i + \beta_{10} Growth\_Enrollment_{i,t} + \\ & \beta_{11} Growth\_Enrollment_{i,t} * Factor(University\_Stature)_{i,t-1} + \beta_{12} Growth\_University\_Stature_{i,t} + \\ & \beta_{13} Growth\_University\_Stature_{i,t} * Factor(University\_Stature)_{i,t-1} + \varepsilon_{i,t}\end{aligned}$$

$$
\begin{aligned}
(14)\quad Total\_Pay_{i,t} = {} & \beta_0 + \beta_1 Factor(Prior\_University\_Stature)_i + \\
& \beta_2 Prior\_University\_Enrollment_i + \beta_3 Factor(Present\_University\_Stature)_{i,t-1} + \\
& \beta_4 Present\_University\_Enrollment_{i,t-1} + \beta_5 Factor(Experience)_{i,t-1} + \beta_6 Academic\_Background_i + \\
& \beta_7 Administration\_Background_i + \beta_8 JD\_Degree_i + \beta_9 Gender_i + \beta_{10} Growth\_Enrollment_{i,t} + \\
& \beta_{11} Growth\_Enrollment_{i,t} * Factor(University\_Stature)_{i,t-1} + \beta_{12} Growth\_Enrollment_{i,t} * Enrollment_{i,t-1} \\
& \beta_{13} Growth\_University\_Stature_{i,t} + \beta_{14} Growth\_University\_Stature_{i,t} * Factor(University\_Stature)_{i,t-1} \\
& \beta_{15} Growth\_University\_Stature_{i,t} * Enrollment_{i,t-1} + \varepsilon_{i,t}
\end{aligned}
$$

Past performance is measured by the same university stature measures listed above and the size of the previous university. Specifically, *Factor(Prior University Stature)* is the same factor score as *Factor(Present University Stature)* using the data from the previous university. *Past University Enrollment* is the enrollment of the previous university. For those individuals who have worked as a university president at more than one previous university, I chose the most recent one. Both *Factor(Prior University Stature)* and *Prior University Enrollment* are measures of past experience that signal the president's unobservable ability, thus I expect them to have positive signs. Equations (11) and (12) introduce the two performance measures of the percent changes in the university's enrollment and stature along with their interactions with the present university's stature and enrollment to simultaneously test Hypotheses 2 and 3. I do not include the compensation in the previous university in my models because of data limitation.

Sample Data

Table 11 shows the sample selection procedure and sample distribution. I begin with the compensation of presidents at 906 private universities provided by *The Chronicle*'s pay-and-benefit survey from the academic year 2001-2002 to the academic year

2005-2006, yielding 3,369 university-year observations.[3] *The Chronicle* compiled the information from Form 990 that each institution filed with the Internal Revenue Service (IRS). According to IRS regulations, nonprofit organizations, such as colleges, must release a copy of Form 990 which requires the filer to list, along with other financial data, the pay and benefits of their officers, directors, trustees, and key employees. University stature data, such as SAT scores, professors' salary, tuition, endowment, and enrollment, were obtained from the integrated postsecondary education data system (IPEDS) which is provided by the National Center for Education Statistics. After merging the compensation data with the IPEDS dataset, I have 484 universities (1,731 university-year observations). Finally, I hand-collected personal data of university presidents from their biographies in the Marquis Who's Who database. My final sample includes 279 universities for 5 years, yielding 1,011 university-year observations.

Table 12 provides descriptive statistics for presidential compensation, ability measures, and other independent variables. The total compensation and salary of university presidents are \$335,960 and \$278,716 on average, respectively. The mean and median of Working Years are 34.04 and 34 respectively. The means for President Tenure and University Tenure are 10.04 and 12.87, respectively. The average age is 60.4 years old. 79% of presidents have worked as a dean, provost, or vice president. Those who do not have administration experience in higher education usually have worked in government, a law firm, or as a priest in a church. Only 49% of presidents have been a professor. Some presidents started their work as clerks, lawyers, or employees in government. These presidents, who have worked outside of higher education, transferred to university

[3]My sample includes only private universities since the compensation data for public universities are not available for my sample period.

administration positions directly instead of starting from an academic position. 20% of presidents have worked as a president in a prior university. 9.2% of presidents hold a JD degree.[4]

My sample shows that, in recent years, the compensation of university presidents at private universities has been increasing rapidly. According to the compensation database in the Chronicle of Higher Education, in 2006, 28 university presidents earned more than $800,000 and 15 presidents exceeded the $1 million mark. The average compensation of university presidents in my sample increased from $295,915 in 2001 to $362,084 in 2006. The highest compensation was $651,000 and $1,313,255 in 2001 and 2006, respectively.

Since many of these variables are highly correlated, I performed factor analysis. Two reliable factors are reported in Table 13, derived from the Scree Test and Akaike Information Criterion. *Factor*(*University Stature*) is formed by four variables: SAT scores, professors' salary, tuition, and endowment. This factor is a proxy for the reputation and complexity of the university. *Factor*(*Experience*) also comprises four variables: university tenure, president tenure, working years, and age. This factor is a proxy for the experience accumulated by a university president.[5] I expect that total compensation is positively associated with both factors.

Table 14 shows the Pearson correlations among the variables. There are only two correlations above 0.4. One is that between Total_Pay and Factor(University Stature) (0.598), the other is that between Total_Pay and Enrollment (0.416). These strong positive relations are consistent with my fourth hypothesis. The correlation between

[4] 96% of university presidents hold a Ph.D degree.

[5] Initially, I had three factors, with the third factor having high loadings on Academic, Administration, Prior Presidency, and JD. However, the Cronbach Alpha of the third factor is 0.389, indicating it is not reliable. In my reported regressions, I use them as separate variables instead of a third factor.

Factor(University Stature) and Enrollment is 0.313, indicating that more complex university is usually larger. The correlation between Factor(University Stature) and Academic Background is 0.319, which shows more complex universities tend to have a university president with academic background. All other correlation coefficients are below 0.3.

Empirical Results

Column I of Table 15 presents the results for annual regressions of equation (7) to determine the impact of the university's complexity and the president's ability on the president's total compensation.[6] To avoid serial correlation problems in my time series, I run regressions on a year-by-year basis and report the mean coefficients and related Fama-MacBeth t-statistics. I find that *Factor(Experience), Academic, Prior Presidency*, and *JD* have significant and positive effects on total compensation, providing support for the fourth hypothesis that the compensation of university presidents is positively associated with their ability. Only one measure of ability, *Administration*, has an insignificant effect on total compensation. The mean coefficient on *Factor(Experience)* is 0.021 (Fama-MacBeth t-statistic=1.894), which means that one unit in *Factor(Experience)* factor scores improves total compensation by 2.1% ($e^{0.021}$=1.021), holding all else constant. This is consistent with evidence that both tenure and age have significant positive effects on executive compensation (Fisher and Govindarajan, 1992; Harris and Helfat, 1997; Cheng, 2004). The mean coefficient estimates for *Academic* and *Prior Presidency* are 0.063 (Fama-MacBeth t-statistic=4.592) and 0.070 (Fama-MacBeth t-statistic=5.381), respectively, indicating that university presidents that are tenured professors and have experience as presidents have 6.5% ($e^{0.063}$=1.065) and 7.3%

[6]My results are robust to using the salary of university presidents as the dependent variable.

($e^{0.070}$=1.073) higher total compensation, respectively. The mean coefficient for *JD* is 0.138 (Fama-MacBeth t-statistic=2.912), suggesting that presidents with a JD degree earn 14.8% ($e^{0.138}$=1.148) more than those holding other degrees.[7]

I next turn to university stature. The mean coefficient on *Factor(University Stature)* is positive and significant (coefficient=0.207, Fama-MacBeth t-statistic=46.826), which denotes a total compensation increase of 23.0% ($e^{0.207}$=1.230) resulting from an increase in one unit of *Factor(University Stature)*, holding all else constant. This result agrees with my second hypothesis. Consistent with prior studies, university size as measured by *Enrollment* has a significant and positive effect on total compensation. Finally, *Gender* shows an insignificant impact.

Column II of Table 15 provides the results for equation (8), which includes the two contemporaneous performance measures, i.e. the percent changes in the university's enrollment and stature. I find that the contemporaneous performance measures are not significantly associated with the president's total compensation. The results relating to the president's ability measures and the university's stature and enrollment are similar to those for equation (13), with the exception of *Factor(Experience)*, which is no longer significant. An F-test shows that the two performance measures make no marginal contribution to the estimation models. Therefore, the compensation contracts of university presidents are associated to a greater degree with ability measures rather than performance measures, in line with my overall argument that adverse selection plays a greater role than moral hazard.

Column III of Table 15 provides the results for equation (9), which includes the

[7]Among presidents without a JD degree, there are 86.8% holding a Ph.D. degree in other fields and 4% without a Ph.D. degree which does not show a significant difference in their compensation.

interactions of university stature with the two performance measures, i.e. the percent changes in the university's enrollment and stature. I find that the interaction terms have no significant impact on the compensation of university presidents. This suggests that the role of presidential effort does not explain the impact of the university's stature on the president's compensation. That is, the presidents of high stature universities are not compensated to a greater degree because they must exert high effort; rather, their compensation reflects the ability that is required to perform such a complex task. Interpreting my findings in the context of executive compensation, this validates the common empirical technique of including measures of organizational complexity as control variables. However, whereas some branches of the literature have argued that organizational complexity should be included to control for the fact that CEOs of more complex firms must work harder, I argue it controls for the fact that the return on managerial ability is greater at a more complex firm. Furthermore, as with equation (8), the performance measures themselves are insignificant. The results relating to the president's ability measures and the university's stature and enrollment remain significant, being similar to those for equation (8). Overall, then, the evidence suggests that ability measures are more important than performance measures in the compensation of university presidents.

Column IV of Table 15 provides the results for equation (10), which includes the interactions of enrollment with the two performance measures, i.e. the percent changes in the university's enrollment and stature. There are two differences from results in the Column III, first, total compensation is positive and marginally significant related to the growth of enrollment; second, the total compensation is negative and marginally significant related to the interaction term Growth_Enrollment*Factor(University_Stature). It is reasonable that pay is higher for those who expand the size of the university, which is consistent with the extensive evidence of pay-for-performance. Only one of the coefficients on the interaction terms is significant. This provides partial support for H3c, which is the pay-performance-sensitivity of a university president is negatively related to the organizational complexity.

Column I of Table 16 estimates equation (11) to examine the determinants of the total compensation of university presidents with a prior presidency. Total compensation is significantly and positively associated with the stature and size of the president's past university, in agreement with my second hypothesis: the mean coefficient on *Factor(Prior University Stature)* is 0.017 (Fama-MacBeth t-statistic=2.529), and the mean coefficient on *Prior University Enrollment* is 0.182 (Fama-MacBeth t-statistic=15.376). The measures of ability *Administration* and *JD* remain positive and significant. On the other hand, *Academic Background* is no longer significant, and the mean coefficient on *Factor(Experience)* is negatively significant, which is the opposite of my expectation. A possible explanation is that *President Tenure* and *University Tenure*, which are components of *Factor(Experience),* are less important for presidents that have presidential experience. The control variable *Gender* remains insignificant. Finally, even after controlling for the stature and size of the president's past university, I find that *Factor(Present University Stature)* and *Present University Enrollment* are positive and significant.

Column II of Table 16 provides the results for equation (12), which includes the two contemporaneous performance measures, i.e. the percent changes in the university's enrollment and stature. I find that, among presidents with a prior presidency, the contemporaneous performance measures are not significantly associated with the president's total compensation. In other words, my argument that adverse selection is more relevant than moral hazard is robust: the total compensation of university presidents is associated with ability measures, rather than performance measures.

Column III of Table 16 provides the results for equation (13), which includes the interactions of university stature with the two performance measures, i.e. the percent changes in the university's enrollment and stature. Column IV of Table 16 provides the results for equation (14), which includes the interactions of enrollment with the two performance measures, i.e. the percent changes in the university's enrollment and stature. Consistent with the results in Column III and Column IV of Table 15, there is no significant relation between compensation and these interaction terms. Therefore, even after controlling for the performance of the president at a prior university, contemporaneous performance has not impact on compensation, either directly or indirectly via the university's stature and enrollment. I conclude that presidential effort does not explain the association between the university's complexity and the president's compensation. The presidents of more complex universities are compensated to a greater degree because the return on the second dimension of ability (that is unobservable to researchers, but is observable to universities and their presidents) is greater at high stature universities, not because such presidents must exert high effort.

CHAPTER 5
CONCLUSION AND FUTURE RESEARCH

This dissertation demonstrates the competing roles of managerial effort (moral hazard) and ability (adverse selection) in executive compensation; and expounds upon the empirical means by which to tease out the differences between the two, specifically as they relate to the positive association between organizational complexity (e.g., firm size and diversification) and executive compensation. Unlike prior studies that have focused on the moral hazard problem, this dissertation demonstrates that optimal incentive contracts must take into account both the agent's unobservable ability and effort. This is important especially when the relative importance of their ability is considerable, as occurs in R&D intensive firms and high educational institutions.

First, this dissertation examines the moderating effect of R&D intensity on weights on signals of ability and financial performance measures in executive compensation contracts. There are many studies that investigate the impact of R&D intensity on total executive compensation (Dechow and Sloan 1991; Kwon and Yin 2006; Cheng 2004). Prior studies did not, however, formally incorporate adverse selection in their analysis. In particular, they did not investigate how R&D intensity influences the affect of managerial ability on executive compensation. This dissertation investigates how R&D intensity impacts the weights placed on the human capital measures, such as technical work experience, the level of the science degree, and past experience in R&D intensive firms. I find that R&D intensive firms pay more to executives with technical work experience and relevant education, which would be positively related to their managerial ability for R&D intensive firms. Since R&D intensity increases the complexity of executives' jobs, the marginal return on ability is higher in R&D intensive firms. And, therefore, in optimal incentive contracts, weight on the ability of executives increases with R&D intensity. In particular, being knowledgeable in the field of technology is helpful in determining long-term strategy, competing with competitors, managing the R&D labor force, and protecting intangible assets. Therefore, my results show premiums are paid to those with engineering or science experience and those with relevant education in R&D intensive firms.

Additionally, my results show that the weights on both accounting and stock returns in total compensation decrease with R&D intensity. Low weight on accounting returns is due to the decreasing value-relevance of accounting measures in R&D intensive firms. Low weight on stock returns is due to the low precision of stock returns in R&D insensitive firms. Prior studies document that R&D intensive firms grant more stock options and restricted stocks to their executives (Kole, 1997; Smith and Watts, 1992). Consistent with their findings, my results also show the proportion of equity-based pay in the total compensation is positively related to the R&D intensity. Equity-based pay (long-term incentives) rather than cash pay (short-term incentives) are dominant in R&D intensive firms. This may arise from the extended time that capital markets need to recognize the value of R&D investment. In the short-term, due to the high information asymmetry between investors and managers in R&D intensive firms, the stock prices are less likely to reflect the intrinsic value of these firms. The weights on stock returns therefore are negatively related with R&D intensity.

Second, I examine the determinants of the compensation of university presidents using a unique dataset. I argue that adverse selection, rather than moral hazard, should play a greater role in the compensation of university presidents since the main function of compensation is to attract high quality candidates rather than implement incentive compatibility (i.e., so as to ensure the exertion of high effort). Inspired by Hayes and Schaefer (2000), I postulate that there are two forms of ability: one dimension of ability that is known by the agent and unobservable to all others; and a second form of ability that is known by the principal and agent, but unobservable to researchers. The second dimension of ability includes desirable personality traits reflected by perceptions and observations acquired by employers via social interactions with executives and potential candidates for executive positions.

I presume that universities have access to an informative signal about the president's suitability for the position, which is unobservable to researchers because the information is obtained during the interview process and via social networking. Since individuals with favorable personality traits are more adept at guiding or heading a more complex university, the total compensation of the university presidents increase with the stature and enrollment of the universities they are leading. Thus, I predict that running a regression of the president's compensation on organizational complexity should yield a positive coefficient. On the other hand, if organizational complexity affects the return on the president's effort, then this should be reflected in the sensitivity of the president's compensation with respect to performance measures. Furthermore, due to the adverse selection problem, the compensation of university presidents should increase with their ability. Finally, among presidents with a prior presidency, the stature and size of their past university should have a positive effect on their present compensation, since they would be favorable signals of ability.

I constructed a sample drawn from 279 private universities spanning the academic years 2001-2002 to 2005-2006, yielding a total of 1,011 university-year observations. In agreement with my hypotheses, my empirical results show that the total compensation of university presidents is positively associated with measures of the president's human capital. For the sub-sample with a prior presidency, I find that universities pay higher compensation to those who have served as presidents of universities with a higher rating and, in some cases, larger universities, in accord with my hypothesis. My key finding is that though highly rated universities and even larger universities offer greater pay to their presidents, the effect does not operate via performance measures. I argue that this suggests that presidents of more complex universities yield a greater return on their ability, but not their effort. Including measures of organizational complexity such as firm size and diversification as control variables is the appropriate means by which to control for such effects.

In terms of empirical studies of executive compensation, the implication of my analysis is that it is necessary to consider both moral hazard problems and adverse selection problems, especially in ability-intensive situations. There is a need for many of these potential research questions to be explored further. First, there are many more situations in which managerial tasks are more challenging. For instance, executives, who work in, market-intensive firms, or capital intensive firms, need to deal with the difficulty in competitive risk, and resource searching. Second, it is possible to sharpen the ability measures of executives in different ways. It will be interesting to explore what type of ability matters in the selection of CEOs by doing a survey with the CEO selection committee or board of directors.

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Table 1: Variable Definition for R&D Intensity and Executive Compensation.

Variables	Definitions
Ln(TOTALPAY $_{i,t}$)	Logarithm of CEO's total compensation for the fiscal year, including salary, bonus, stock option, restricted stocks and other long-term incentives.
R&D $_{i,t}$	The fractional rank of the ratio of the company's R&D expenditures to sales. It is positively related to R&D ratios. Range from [0, 1].
RET $_{i,t}$	Stock returns to shareholders for the fiscal year.
ROA $_{i,t}$	Earnings before extraordinary items divided by total assets at the end of the fiscal year.
TECHIE $_{i,t}$	1 if the CEO has worked as a scientist or as an engineer in an industry-related area; otherwise 0.
SCIENCE $_{i,t}$	1 if the CEO has a major in science or engineering at the bachelor, master, or doctorate level; otherwise 0. The science degree includes natural science, computer science, and mathematics.
PASTEXP $_{i,t}$	1 if the CEO has worked at any management position in firms in related R&D intensive industries, 0 otherwise. R&D intensive industries include Recreational Products, Medical Equipment, Pharmaceutical Products, Computers, Business Service, Electronic Equipment, Measuring and Control Equipment. (The corresponding Fama-French Industry codes are 6, 12, 13, 35, 36, 37 or 38).
MBA $_{i,t}$	1 if the CEO holds a master degree in business administration; otherwise 0.
Ln(Tenure_CEO $_{i,t}$)	Logarithm of the number of years that the CEOs have worked as CEOs.
MB $_{i,t}$	The ratio of market value to book value at the end of fiscal year.
Ln(TA $_{i,t}$)	Logarithm of total assets at the end of the fiscal year.
Noise_ROA $_{i,t}$	The fractional rank of time-series variance of ROA for each firm, starting from 1992.
Noise_RET $_{i,t}$	The fractional rank of time-series variance of RET for each firm, starting from 1992.

Table 2: Descriptive statistics of compensation, corporate financial characteristics and CEO's personal data

Variable	Mean	Std Dev	Lower Quartile	Median	Upper Quartile
$Totalpay_{i,t}$ ($000)	5316.63	26782.3	1164.05	2511.36	5349.6
$Ln(Totalpay_{i,t})$	7.697	1.05	6.927	7.672	8.41
$R\&D_{i,t}$ (rank)	0.626	0.141	0.529	0.529	0.71
$R\&D_{i,t}$ (ratio)	0.066	1.017	0	0	0.028
$ROA_{i,t}$	0.051	0.08	0.026	0.051	0.088
$Noise\_ROA_{i,t}$ *	0.287	0.201	0.116	0.252	0.424
$RET_{i,t}$	0.195	0.487	-0.086	0.128	0.367
$Noise\_RET_{i,t}$ *	0.314	0.236	0.115	0.258	0.468
$TECHIE_{i,t}$	0.102	0.302	0	0	0
$SCIENCE_{i,t}$	0.079	0.271	0	0	0
$PASTEXP_{i,t}$	0.047	0.211	0	0	0
$MBA_{i,t}$	0.295	0.456	0	0	1
$Tenure\_CEO_{i,t}$	10.145	8.058	5	8	13
$Ln(Tenure\_CEO_{i,t})$	2.04	0.758	1.609	2.079	2.565
$MB_{i,t}$	3.412	3.195	1.644	2.418	3.931
$Ln(TA_{i,t})$	7.585	1.491	6.522	7.508	8.634

This panel reports the descriptive statistics of CEO total compensation, corporate financial characteristics, and CEOs' personal data for 9368 firm-year observations from 1992 to 2006. *The sample for Noise_ROA and Noise_RET is 8307 firm-year observations for the same sample period. Total compensation is measured in $000. Total compensation is converted into 1992 dollars according to the consumer price index. To alleviate outlier problems, I delete observations with continuous variables at the bottom 1% and the top 1% levels.

Table 3: The mean of R&D Intensity in Fama-French Industry

Fama-French Industry code	Industry name	SIC code	Mean of R&D rank	Mean of R&D ratio
1	Agriculture	0100-0799,2048-2048	0.704	0.051
2	Food Products	2000-2046,2050-2063,2070-2079,	0.554	0.004
3	Candy and Soda	2090-2095,2098-2099	0.618	0.012
4	Alcoholic Beverages	2064-2068,2086-2087,2096-2097, 2080-2085,	0.532	0.0004
5	Tobacco Products	2100-2199	0.572	0.006
6	Recreational Products	0900-0999,3650-3652,3732-3732, 3930-3949	0.691	0.072
7	Entertainment	7800-7841,7900-7999	0.529	0
8	Printing and Publishing	2700-2749,2770-2799	0.539	0.002
9	Consumer Goods	2047-2047,2391-2392,2510-2519,2590-2599,2840-2844,3160-3199, 3229-3231,3260-3260,3262-3263,3269-3269,3630-3639,3750-3751, 3800-3800,3860-3879, 3910-3919, 3960-3961,3991-3991,3995-3995	0.648	0.021
10	Apparel	2300-2390,3020-3021,3100-3111, 3130-3159,3965-3965	0.534	0.001
11	Healthcare	8000-8099	0.529	0
12	Medical Equipment	3693-3693,3840-3851	0.803	0.080
13	Pharmaceutical Products	2830-2836	0.886	0.295
14	Chemicals	2800-2829,2850-2899	0.685	0.028
15	Rubber and Plastic Products	3000-3000,3050-3099	n/a	n/a
16	Textiles	2200-2295, 2297-2299, 2393-2395, 2397-2399	0.530	0.0001
17	Construction Materials	0800-0899,2400-2439,2450-2459,2490-2499,2950-2952,3200-3219, 3240-3259,3261-3261,3264-3264,3270-3299,3420-3442,3446-3452, 3490-3499,3996-3996	0.570	0.006
18	Construction	1500-1549,1600-1699,1700-1799	0.529	0.00002
19	Steel Works, Etc.	3300-3369,3390-3399	0.587	0.011
20	Fabricated Products	3400-3400,3443-3444,3460-3479	0.572	0.006

21	Machinery	3510-3536,3540-3569,3580-3599	0.690	0.044
22	Electrical Equipment	3600-3621,3623-3629,3640-3646,3648-3649,3660-3660,3691-3692,3699-3699	0.678	0.026
23	Miscellaneous	3900-3900,3990-3990,3999-3999, 9900-9999	n/a	n/a
24	Automobiles and Trucks	2296-2296,2396-2396, 3010-3011,3537-3537,3647-3647,3694-3694, 3700-3716, 3790-3792,3799-3799	0.670	0.024
25	Aircraft	3720-3729	0.705	0.034
26	Shipbuilding, Railroad	3730-3731,3740-3743	0.653	0.023
27	Defense	3480-3489,3760-3769,3795-3795	0.662	0.020
28	Precious Metals	1040-1049	0.532	0.0003
29	Nonmetallic Mining	1000-1039,1060-1099,1400-1499	0.549	0.003
30	Coal	1200-1299	0.529	0.0001
31	Petroleum and Natural Gas	1310-1389,2900-2911,2990-2999	0.549	0.003
32	Utilities	4900-4999	0.530	0.0001
33	Telecommunications	4800-4899	0.536	0.002
34	Personal Services	7020-7021,7030-7039,7200-7212,7215-7299,7395-7395,7500-7500, 7520-7549,7600-7699,8100-8199,8200-8299,8300-8399,8400-8499, 8600-8699,8800-8899	0.530	0.0002
35	Business Services	2750-2759,3993-3993,7300-7372,7374-7394,7397-7397,7399-7399, 7510-7519, 8700-8748, 8900-8999	0.684	0.071
36	Computers	3570-3579,3680-3689,3695-3695, 7373-7373	0.804	0.097
37	Electronic Equipment	3622-3622,3661-3679,3810-3810, 3812-3812	0.815	0.123
38	Measuring and Control Equip	3811-3811,3820-3830	0.827	0.097
39	Business Supplies	2520-2549,2600-2639,2670-2699, 2760-2761,3950-3955	0.610	0.013
40	Shipping Containers	2440-2449,2640-2659,3210-3221, 3410-3412	0.565	0.005
41	Transportation	4000-4099,4100-4199,4200-4299,4400-4499,4500-4599,4600-4699, 700-4799	0.529	0
42	Wholesale	5000-5099,5100-5199	0.533	0.0005
43	Retail	5200-5299,5300-5399,5400-5499,5500-5599,5600-5699,5700-5736, 900-5999	0.530	0.0004
44	Restaurants, Hotel, Motel	5800-5813,5890-5890,7000-7019,7040-7049,7213-7213	0.529	0.0001

Table 4: Pearson Correlation Matrix

	R&D	RET	ROA	TECHIE	SCIENCE	PASTEXP	MBA	Tenure_CEO	MB	TA	Noise_RET*	Noise_ROA*
Total_pay	0.148	0.045	0.086	0.021	0.021	0.027	0.073	-0.137	0.218	0.599	-0.041	-0.001
	<.0001	<.0001	<.0001	0.055	0.055	0.015	<.0001	<.0001	<.0001	<.0001	0.000	0.919
R&D		0.012	0.089	0.180	0.145	0.273	0.061	-0.046	0.241	-0.020	0.198	0.363
		0.259	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.071	<.0001	<.0001
RET			0.160	0.001	0.001	0.020	0.004	0.033	0.263	-0.070	0.126	0.038
			<.0001	0.945	0.941	0.068	0.706	0.003	<.0001	<.0001	<.0001	0.001
ROA				0.007	0.004	0.053	0.015	0.060	0.381	-0.105	-0.051	-0.008
				0.549	0.721	<.0001	0.173	<.0001	<.0001	<.0001	<.0001	0.442
TECHIE					0.885	0.053	-0.031	0.072	-0.001	0.035	0.009	0.056
					<.0001	<.0001	0.005	<.0001	0.920	0.001	0.415	<.0001
SCIENCE						0.072	-0.036	0.065	-0.015	0.030	-0.006	0.042
						<.0001	0.001	<.0001	0.164	0.005	0.551	0.000
PASTEXP							-0.007	-0.013	0.107	-0.077	0.105	0.173
							0.532	0.252	<.0001	<.0001	<.0001	<.0001
MBA								-0.053	0.040	0.080	-0.061	-0.001
								<.0001	0.000	<.0001	<.0001	0.959
Tenure_CEO									-0.019	-0.217	0.107	-0.002
									0.084	<.0001	<.0001	0.884
MB										0.034	0.028	0.114
										0.002	0.009	<.0001
TA											-0.295	-0.284
											<.0001	<.0001
Noise_RET												0.532
												<.0001

This table reports the Pearson correlation matrix between the CEO total compensation and the independent variables for 9368 firm-year observations. *The correlation with Noise_ROA and Noise_RET is for 8307 firm-year observations.

Table 5: Fama MacBeth Regressions of Total Compensation (Year-by-year Regressions from 1992 to 2006)

Variable	Expected Sign	Column I		Column II		Column III	
		Ln(TOTALPAY)		Ln(TOTALPAY)		Ln(TOTALPAY)	
		mean coefficient estimate	Fama MacBeth t-Statistics	mean coefficient estimate	Fama MacBeth t-Statistics	mean coefficient estimate	Fama MacBeth t-Statistics
Intercept		2.954	18.247	2.905	16.956	2.945	18.437
R&D	+	2.202***	8.217	2.262***	7.626	2.205***	8.186
RET	+	0.425***	4.077	0.420***	3.995	0.438***	4.268
RET*R&D	-	-0.411***	-2.229	-0.392**	-2.008	-0.431**	-2.498
ROA	+	6.215***	3.712	6.490***	3.403	6.236***	3.594
ROA*R&D	-	-7.128***	-3.167	-7.513***	-2.912	-7.174***	-3.074
TECHIE	+	-0.297**	-2.304				
TECHIE* R&D	+	0.397**	2.240				
SCIENCE	+			-0.047	-0.215		
SCIENCE* R&D	+			0.259**	1.805		
PASTEXP	+					-0.129	-0.832
PASTEXP* R&D	+					0.069	0.447
MBA	+	0.109*	1.349	0.118*	1.354	0.129*	1.444
MBA*R&D	-	-0.200*	-1.473	-0.222*	-1.600	-0.235*	-1.605
Ln(Tenure_ CEO)	+	0.225***	3.511	0.226***	3.220	0.205***	3.191
Ln(Tenure_ CEO)*R&D	-	-0.345***	-3.489	-0.345***	-3.170	-0.310***	-3.149
MB	+	0.059***	4.395	0.060***	4.231	0.059***	4.310
ln(TA)	+	0.396**	20.689	0.397***	21.279	0.396***	20.043
Nobs		9368		9368		9368	
adjr2		0.389		0.368		0.392	

This table reports the annual regression results for equation (1)--(3) for firms with CEOs' personal data by controlling the CEOs' tenure. White's (1980) heteroscedasticity tests show the models are not in violation of the assumption of the homoscedastic errors.
*, **, and *** indicate statistical significance levels at 10 percent, 5 percent, and 1 percent respectively, in one-tailed tests. To alleviate outlier problems, I delete the observations with continuous variables at the bottom 1% and the top 1% levels.

Table 6: Fama MacBeth Regressions of Total Compensation after controlling for the variance of ROA and RET (Year-by-year Regressions from 1992 to 2006)

Variable	Expected Sign	Column I		Column II		Column III	
		Ln(TOTALPAY)		Ln(TOTALPAY)		Ln(TOTALPAY)	
		mean coefficient estimate	Fama MacBeth t-Statistics	mean coefficient estimate	Fama MacBeth t-Statistics	mean coefficient estimate	Fama MacBeth t-Statistics
Intercept		2.820	17.094	2.795	19.242	2.758	18.467
R&D	+	1.487***	6.237	1.467***	6.170	1.535***	5.939
RET	+	0.652***	3.376	0.670***	3.393	0.573***	4.256
RET*R&D	-	-0.436**	-1.737	-0.458**	-1.844	-0.328*	-1.607
RET* Noise_RET	-	-0.521***	-3.542	-0.525***	-3.734	-0.473***	-4.019
ROA	+	7.918***	3.313	7.754***	3.311	7.848***	3.339
ROA*R&D	-	-4.586***	-3.289	-4.534***	-2.962	-4.399***	-3.181
ROA* Noise_ROA	-	-6.910**	-1.682	-6.682*	-1.625	-7.036**	-1.726
TECHIE	+	-0.254**	-2.099				
TECHIE* R&D	+	0.351**	1.964				
SCIENCE	+			-0.061	-0.792		
SCIENCE* R&D	+			0.208***	2.043		
PASTEXP	+					-0.146	0.820
PASTEXP* R&D	+					0.135	0.674
MBA	+	0.178**	1.973	0.093	0.843	0.155*	1.486
MBA*R&D	-	-0.319**	-2.314	-0.189*	-1.285	-0.273**	-1.906
Ln(Tenure_ CEO)	+	0.167***	2.878	0.167***	2.693	0.170***	2.548
Ln(Tenure_ CEO)* R&D	-	-0.248***	-2.650	-0.240***	-2.460	-0.253***	-2.358
MB	+	0.044***	8.419	0.048***	7.069	0.043***	8.523
ln(TA)	+	0.426***	15.167	0.428***	16.328	0.429***	16.078
Noise_RET	+	0.253***	3.146	0.251***	3.542	0.265***	3.536
Noise_ROA	+	0.856***	3.824	0.858***	3.822	0.867***	3.924
Nobs		8307		8307		8307	
adjr2		0.416		0.394		0.428	

This table reports the annual regression results for equation (4)—(6) for firms with CEOs' personal data by controlling the CEOs' tenure. White's (1980) heteroscedasticity tests show the models are not in violation of the assumption of the homoscedastic errors.

*, **, and *** indicate statistical significance levels at 10 percent, 5 percent, and 1 percent respectively, in one-tailed tests. To alleviate outlier problems, I delete the observations with continuous variables at the bottom 1% and the top 1% levels.

TABLE 7 Fama MacBeth Regressions of Equity Pay and Equity Proportion (Year-by-year Regressions from 1992 to 2006)

Variable	Equity Pay		Equity Pay		Equity Proportion		Equity Proportion	
	mean coefficient estimate	Fama MacBeth t-Statistics	mean coefficient estimate	Fama MacBeth t-Statistics	mean coefficient estimate	Fama MacBeth t-Statistics	mean coefficient estimate	Fama MacBeth t-Statistics
Intercept	-1.772***	-6.370	-1.096***	-3.262	-0.153***	-8.069	-0.092***	-4.244
R&D	3.814***	10.798	3.806***	9.244	0.424***	16.841	0.421***	16.558
RET	0.042	0.371	0.022	0.217	-0.011	-0.886	-0.013	-1.104
ROA	-0.390	-0.373	-0.273	-0.254	-0.183	-1.226	-0.174	-1.140
MB	0.081**	1.949	0.073**	1.906	0.012***	2.784	0.011***	2.820
ln(TA)	0.560***	9.725	0.529***	10.310	0.027***	6.200	0.024***	6.040
TECHIE			-0.149	-1.271			-0.006	-0.636
MBA			0.177	0.850			0.008	0.542
Ln(Tenure_ CEO)			-0.224***	-2.048			-0.020***	-2.620
Nobs	9368		9368		9368		9368	
adjr2	0.097		0.110		0.086		0.094	

This table reports the annual regression results for Equity Pay and Equity Proportion. Equity Pay equals the sum of restricted stock grant and granted stock option (Black Scholes Value). Equity Proportion is the proportion of equity pay in the total compensation, i.e., the Equity Pay divided by the total compensation.
White's (1980) heteroscedasticity tests show the models are not in violation of the assumption of the homoscedastic errors.
*, **, and *** indicate statistical significance levels at 10 percent, 5 percent, and 1 percent respectively, in one-tailed tests. To alleviate outlier problems, I delete the observations with continuous variables at the bottom 1% and the top 1% levels.

TABLE 8
Replicate Baber et al. (1996) OLS regression of the change in total compensation

Variable	ΔLn(TOTALPAY)	
	Coefficient Estimate	t-Statistics
Intercept	0.104	1.020
IOS	0.071	0.440
RET	0.355*	1.520
RET*IOS	0.124	0.340
ΔROE	4.448***	2.850
ΔROE*IOS	3.768*	1.590
Nobs	723	
adjr2	0.021	

This table covers a sample period for fiscal year 1992 and 1993. I follow the sample selection criteria in Baber et al. (1996). Total observations are 723 which is smaller than the sample in Baber et al (1996), since their sample is collected from proxy statement instead of ExecuComp. Follow Baber et al. (1996), the dependent variable is $\Delta ln(TOTALPAY_t)$, which is the first difference of $ln(TOTALPAY_t)$ and $ln(TOTALPAY_{t-1})$ scaled by the salary in previous year. ΔROE_t is the first difference between ROE_t and ROE_{t-1}.

Other variable definitions are the same as in table 1.

*, **, and *** indicate statistical significance levels at 10 percent, 5 percent, and 1 percent respectively, in one-tailed tests.

TABLE 9
Replicate Kwon and Yin (2006) OLS regression of the change in total compensation

Variable	ΔLn(TOTALPAY)	
	Coefficient Estimate	t-Statistics
Intercept	0.208	2.680
IOS	0.018	0.260
RET	0.140**	1.880
RET*HT	0.124*	1.620
ΔROE	0.916	0.510
ΔROE*HT	0.294	0.130
Nobs	1633	
adjr2	0.026	

This table covers a sample period from fiscal year 1993 to 1998. Following the sample selection criteria in Kwon and Yin (2006), I choose high technology firms and match these firms with low technology firms as defined in Francis and Schipper (1999). Similar as Kwon and Yin (2006), HT is dummy variable, 1 if the company is high technology industry (3-digit SIC code: 283, 355, 357, 362, 363, 364, 365, 366, 367, 369, 382, 481, 489, 573, 737), 0 if the company is in low technology industry (3-digit SIC code: 160, 170, 202, 220, 240, 245, 260, 300, 308, 331, 356, 371, 399, 451 and 541).
HT is dummy variable, 1 if the company is high technology industry (3-digit SIC code: same as shown above), and 0 otherwise.
Other variable definitions are the same as in table 8.
*, **, and *** indicate statistical significance levels at 10 percent, 5 percent, and 1 percent respectively, in one-tailed tests.

Table 10: Variable definitions for the compensation of university presidents

Total Pay	Logarithm of total compensation of the president for the academic year, including salary and benefits;
Salary	Logarithm of salary of the president;
President Tenure	Logarithm of the number of years for which the president has worked at the current position at the beginning of the academic year;
University Tenure	Logarithm of the number of years for which the president has worked at the current university at the beginning of the academic year;
Working Years	Logarithm of the number of years working at a full-time job including inside and outside higher education at the beginning of the academic year;
Administration	1 if the president has ever worked as a dean, provost, or vice president at any university; 0 otherwise;
Academic	1 if the president has worked as a tenured professor; 0 otherwise;
Prior Presidency	1 if the president has been a university president in the past; 0 otherwise;
JD	1 if the president has a JD degree; 0 otherwise;
Gender	1 if the president is male; 0 otherwise;
Age	Logarithm of the age of the president at the beginning of the academic year;
Professor Salary	Logarithm of the average salary of professors of all ranks (assistant, associate, and full professor) for the previous academic year in the university;
Tuition	Logarithm of tuition for a full-time undergraduate in-state student for the previous academic year;
Endowment	Logarithm of the market value of endowment per student at the beginning of this academic year in the university;
SAT	Logarithm of the SAT score of freshmen for the previous academic year;
Enrollment	Logarithm of the number of full-time equivalent students for the previous academic year;
Growth_Enrollment	The percent change in enrollment for the previous year;
Growth_University_ Stature	The percent change in the university's stature factor for the previous year.

Table 11
Panel A: Sample Selection Criteria

	# Universities	# University-year Observations
Presidents' compensation data from the Chronicle of High Education, from academic year 2001-2002 to academic year 2005-2006	906	3369
Less: missing data for university stature variables	422	1638
Less: missing data for presidents' personal characteristics	205	720
Final Sample	279	1011

Panel B: Years

Academic Year	# Universities	Percentage
2001-2002	141	13.95
2002-2003	197	19.49
2003-2004	219	21.66
2004-2005	212	20.97
2005-2006	242	23.94
Total	1011	100

Table 12: Descriptive Statistics

Variable	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
Total Pay ($thousand)	335.960	282.507	222.600	0.394	227.963
Salary ($thousand)	278.716	239.861	187.444	330.000	138.577
President Tenure	10.041	9	5	13	6.626
University Tenure	12.866	10	6	17	9.635
Working Years	34.042	34	30	38	6.879
Age	60.399	60	57	64	6.145
Administration	0.787	1	1	1	0.409
Academic	0.494	0	0	1	0.500
Prior Presidency	0.201	0	0	0	0.401
JD	0.092	0	0	0	0.289
Gender	0.784	1	1	1	0.411
Professor Salary ($thousand)	65.626	62.469	54.805	75.987	14.950
Tuition ($thousand)	21.580	21.310	17.580	26.200	5.772
Endowment ($thousand)	119.899	46.619	14.346	132.372	198.951
SAT	1181.950	1170	1080	1285	145.287
Enrollment	4243.670	2327	1492	5020	4903.314

This table reports the descriptive statistics for 1011 observations (279 universities) from 2001 to 2005. Total pay and salary of university presidents are from 2002 to 2006.
To exclude the influence of outliers, I winsorize all continuous variables at 1% and 99%.
See Table 1 for variable definitions.

Table 13: Factor Analysis for University Stature and President's Experience

	Factor(*University Stature*)	*Factor* (*Experience*)
Professor Salary	**0.849**	0.008
Tuition	**0.858**	-0.027
Endowment	**0.804**	-0.181
SAT	**0.924**	-0.140
Age	-0.041	**0.841**
Working Years	-0.022	**0.810**
President Tenure	-0.167	**0.812**
University Tenure	-0.080	**0.752**
Cronbach alpha	0.886	0.823

This table reports the factor analysis for 1011 observations (279 universities) from 2001 to 2005.
Factor(*University Stature*) = Factor that has high loadings on Professor Salary, Tuition, Endowment, and SAT.
Factor(*Experience*) = Factor that has high loadings on University Tenure, President Tenure, Working years, and Age.
See Table 1 for variable definitions.

Table 14: Pearson Correlation Matrix

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0

	Factor (University Stature)	Enrollment	Factor (Experience)	Academic Background	Administration Background	Prior Presidency	JD Degree	Male Gender	*Growth_ University_Stature	*Growth_ Enrollment
Total_Pay	0.598 (<.0001)	0.564 (<.0001)	0.095 (0.003)	0.279 (<.0001)	0.073 (0.020)	0.112 (0.000)	0.107 (0.001)	0.123 (<.0001)	0.050 (0.175)	-0.030 (0.422)
Factor(University Stature)		0.313 (<.0001)	-0.001 (0.983)	0.319 (<.0001)	-0.025 (0.434)	0.042 (0.181)	0.022 (0.488)	0.049 (0.116)	0.136 (0.000)	-0.051 (0.165)
Enrollment			0.111 (0.000)	0.213 (<.0001)	0.105 (0.001)	0.088 (0.005)	0.053 (0.090)	0.190 (<.0001)	-0.020 (0.594)	0.052 (0.163)
Factor(Experience)				0.038 (0.231)	-0.045 (0.155)	0.068 (0.031)	0.036 (0.246)	0.082 (0.009)	-0.015 (0.694)	0.012 (0.740)
Academic Background					0.136 (<.0001)	0.024 (0.451)	-0.081 (0.010)	0.061 (0.054)	0.033 (0.376)	-0.010 (0.780)
Administration Background						0.110 (0.001)	-0.044 (0.165)	-0.002 (0.946)	-0.031 (0.399)	0.038 (0.299)
Prior Presidency							-0.014 (0.650)	0.101 (0.001)	-0.052 (0.162)	-0.017 (0.651)
JD Degree								0.009 (0.781)	0.016 (0.668)	0.027 (0.462)
Male Gender									0.000 (0.992)	0.018 (0.629)
Growth_University _Stature										-0.024 (0.515)

This table reports the Pearson correlation coefficients among the compensation of university presidents and the independent variables for 1011 observations. P-value is in parentheses. *The correlations with Growth_University_Stature and Growth_Enrollment are for 730 observations.

Table 15: Regression Results for the Total Compensation of University Presidents

Variable	Column I		Column II		Column III		Column IV	
	Mean Coefficient Estimate	Fama MacBeth t-Statistics	Mean Coefficient Estimate	Fama MacBeth t-Statistics	Mean Coefficient Estimate	Fama MacBeth t-Statistics	Mean Coefficient Estimate	Fama MacBeth t-Statistics
Intercept	10.816***	131.863	10.824***	109.995	10.746***	145.826	10.728***	129.686
Factor(University Stature)	0.207***	46.826	0.206***	30.742	0.212***	29.220	0.212***	33.156
Enrollment	0.212***	21.622	0.212***	15.277	0.224***	20.737	0.226***	19.383
Factor(Experience)	0.021**	1.894	0.006	0.468	0.0001	0.041	0.001	0.123
Academic Background	0.063***	4.592	0.063***	3.594	0.052***	3.154	0.054***	3.040
Administration Background	0.031	1.093	0.007	0.255	0.014	0.469	0.012	0.421
Prior Presidency	0.070***	5.381	0.080***	4.18	0.059***	4.239	0.060***	3.997
JD Degree	0.138***	2.912	0.168***	7.275	0.143***	8.119	0.148***	8.978
Male Gender	0.007	0.449	0.031	0.913	0.033	1.145	0.033	1.165
Growth_Enrollment			2.42	0.556	-2.257	-0.507	7.463*	1.366
Growth_Enrollment* Factor(University Stature)					-4.582	-1.003	-4.488*	-1.476
Growth_Enrollment* Enrollment							-1.249	-1.233
Growth_University_Stature			-0.004	-0.554	0.012	1.254	0.009	0.302
Growth_University_Stature* Factor(University Stature)					-0.016	-0.251	0.033	1.230
Growth_University_Stature* Enrollment							-0.001	-0.305
Nobs	1011 [a]		730 [b]		730 [b]		730 [b]	

Adj. R^2	0.454		0.441		0.515		0.511	

[a] This is my full sample size is 1011 university-year observations, covering 5 years.
[b] Sample size is 730 university-year observations because four years of observations are available for the contemporaneous performance measures.
White's (1980) heteroscedasticity tests show the models are not in violation of the assumption of homoscedastic errors.
To exclude the influence of outliers, I winsorize all continuous variables at 1% and 99%.
***, **, * Significant at 1 percent, 5 percent, and 10 percent levels, respectively, one-tailed when signs are predicted, two-tailed otherwise.
See Table 1 for variable definitions.

Table 16: Regression Results for the Total Compensation of University Presidents with a Prior Presidency

Variable	Column I		Column II		Column III		Column IV	
	Mean Coefficient Estimate	Fama MacBeth t-Statistics	Mean Coefficient Estimate	Fama MacBeth t-Statistics	Mean Coefficient Estimate	Fama MacBeth t-Statistics	Mean Coefficient Estimate	Fama MacBeth t-Statistics
Intercept	9.765	33.273	9.925	32.506	9.963	20.942	9.814***	15.278
Factor(Prior University Stature)	0.017***	2.529	0.006	1.028	-0.002	-0.387	-0.003	-0.463
Prior University Enrollment	0.182***	15.376	0.150***	7.419	0.151***	13.329	0.157***	8.880
Factor(Present University Stature)	0.215***	12.413	0.295***	6.495	0.362***	4.913	0.365***	4.271
Present University Enrollment	0.104***	4.555	0.177***	5.032	0.189***	5.250	0.194***	2.846
Factor(Experience)	-0.080***	-3.171	-0.111***	-3.455	-0.154***	-2.736	-0.163***	-2.656
Academic Background	-0.022	-0.519	-0.148**	-1.840	-0.128	-1.286	-0.105	-0.854
Administration Background	0.212***	2.355	-0.028	-0.369	0.024	0.218	0.085	0.527
JD Degree	0.489***	5.537	0.316***	12.302	0.352***	4.452	0.362***	4.702
Male Gender	-0.102	-1.162	0.023	0.195	0.084	0.693	0.090	0.708
Growth_Enrollment			10.711	0.743	9.627	0.773	0.702	0.068
Growth_Enrollment* Factor(University Stature)					-27.010	-1.188	-29.177	-1.148
Growth_Enrollment* Enrollment							1.375	0.452
Growth_University_Stature			-0.022	-0.307	-0.021	-0.269	-0.256	-0.930
Growth_University_Stature* Factor(University Stature)					-0.427	-0.442	-0.486	-0.347
Growth_University_Stature* Enrollment							0.029	1.194

Nobs	180 [a]		132 [b]		132 [b]		132 [b]	
Adj. R^2	0.532		0.674		0.747		0.740	

This table is the results for a subsample that includes university presidents with a prior presidency.
Factor(Prior University Stature) is the same factor score as University Stature by using the data from the previous university. Other variables are defined as in Table 1.

[a] My full subsample with a prior presidency is 180 university-year observations, covering 5 years.

[b] Sample size is 132 university-year observations because four years of observations are available for the contemporaneous performance measures.

White's (1980) heteroscedasticity tests show the models are not in violation of the assumption of homoscedastic errors.
To exclude the influence of outliers, I winsorize all continuous variables at 1% and 99%.
***, **, * Significant at 1 percent, 5 percent, and 10 percent levels, respectively, one-tailed when signs are predicted, two-tailed otherwise.

Appendix I: Composition, Responsibilities and Committees of the Board of Trustees: Princeton University

http://www.princeton.edu/~vp/trustees/bdcomp.html

Composition of the Board

Princeton University is governed by a Board of Trustees that consists of no fewer than 23 and no more than 40 members. The President of the University and the Governor of the State of New Jersey serve ex officio with vote. There are three categories of Trustees: Charter and Term Trustees are elected by the Board for terms of ten and four years respectively; Alumni Trustees are elected by the alumni members of the University and serve four-year terms. There are 13 alumni Trustees. Each year the current junior and senior classes and the two most recently graduated classes elect a member of the senior class as an Alumni Trustee. There is always at least one alumnus/alumina of the Graduate School on the Board. In addition to the 13 Alumni Trustees, there are no fewer than four and no more than eight Term Trustees and the remainder of the Board are Charter Trustees. Trustees do not have to be alumni of the University.

Powers and Responsibilities of the Board

The powers and allocations of responsibilities of the Board derive from, and are set forth in, Princeton's original Charter of 1746 and its amendments, from legislation, from the Board's own Bylaws and resolutions it passes from time to time including those delegating authority to various officers of the University, the faculty, and other members of the University community.

The Board has charge and control of the finances and funds of the University. It sets the operating and capital budgets and supervises the investment of the University's endowment which is managed by the Princeton University Investment Company. All campus real estate and long-range physical planning, the determination of architectural styling and landscaping, and the general condition of the University's physical plant are overseen by the Board. The Trustees exercise prior review and approval of substantial new claims on funds, on the allocation of any significant proportion of the University resources, and the setting of priorities for development, changes in instructional method with broad implications for the University, the determination of tuition and fees, changes in admission policies affecting sizeable categories of potential students, and changes in relations with outside educational and social institutions and government agencies.

Committees

The Board carries out its responsibilities and discharges its duties in part through standing committees that include the Executive Committee and the Committees on Academic Affairs; Finance; Grounds and Buildings; Honorary Degrees; Student Life, Health and Athletics; University Resources. In addition Board committees include Alumni Affairs, Audit, Public Affairs, and ad hoc or special committees as necessary.

Meetings

The Board meets five times each year, and the current year's schedule of meeting dates can be found by following this link.

The current Board includes 40 members; emeritus trustees number 36, and emeritus presidents three.

Appendix II
MAJOR TERMS OF PRESIDENTIAL APPOINTMENT FOR DR. M.R.C. GREENWOOD UNIVERSITY OF HAWAII

Title: President of the University of Hawaii

Term: Starting no later than August 24, 2009 for a term of three years (with 2 annual renewal options), with earlier consulting service as needed

Salary: $475,008* per year, with annual review thereafter

Other: Housing allowance of $5,000 per month until scheduled and needed repairs at College Hill are completed—College Hill is currently closed for structural repair Auto allowance per state guidelines (current $326 per month)

Parking near office at no cost

Access to Presidential Support Fund of the UH Foundation to cover expenses for fundraising, travel and similar activities (estimate at $150,000 per year)

Benefits: Eligible for or may participate in various benefit programs available to University employees (e.g. health plan, retirement/pension plan, paid leaves, and pre-tax plans) Details have been provided

Relocation: Actual expense, or allowance for replacement up to $35,000

Tenure: Tenure on appointment at appropriate salary, subject to prior application and approval process

Emeritus Title: Upon successful completion of duties

Termination: One year base pay in the event of termination without cause

Staff Needs: Dr. Greenwood to approve assignment of:

Secretary to President (Eva)

Assistant to President (TBD)

Outside Activities: Based on consultation with Board of Regents

All terms subject to execution of Appointment Agreement

* Dr. Greenwood offered to accept a reduction consistent with other University of Hawaii administrative officers, for example, if salaries are effectively decreased by 10% then the salary would be $427,507.20