

**Effect of CEO Human Capital
on Managerial Decision Making and Firm Growth**

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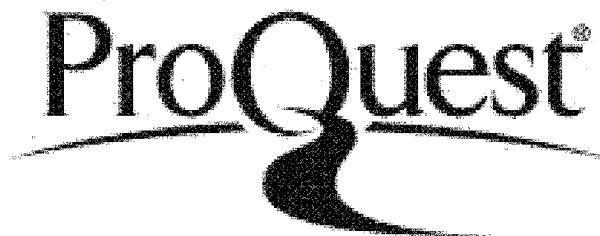


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Dedications

To my parents: Yeonhee Park and Seongyong Koo

To my wife: Inkyoung Gong

To my brother: Kwangjin Koo

To my upcoming daughter

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Abstract

Effect of CEO Human Capital on Managerial Decision Making and Firm Growth

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This dissertation examines how CEO human capital, one of the most critical issues in recent firm research, affects crucial managerial decisions and firm growth.

Academics and practitioners have increasingly focused on human capital given the value that it provides to firms. Scholars have recently begun exploring the role of human capital in CEO selection and compensation schemes. For example, Kaplan, Mark, and Morton (2011) document the important characteristics and abilities of candidate CEOs. Building on upper echelon theory and human capital theory, the present study hypothesizes that managerial decisions and firm performance depend on CEO human capital. It also documents two types of human capital that play mutually exclusive roles in determining fixed and contingent components of compensation: general human capital and firm-specific human capital. My findings suggest that CEO human capital is essential to understanding firm operations, and that general human capital is the most important driver of firms' value-enhancing investment activities over a nine-year period, consistent with human capital theory. Finally, the study outlines possible avenues that scholars can pursue to further examine the role of human capital in managerial decision making and firm growth.

Keywords: Managerial Human Capital, Firm, CEO

Chapter 1: Introduction

This study examines how firms vary with the importance attached to CEO human capital¹ and documents whether strong CEO human capital enhances firm value through optimal managerial decisions. Given that the primary responsibility of a CEO is to increase firm value, how exactly do CEOs enhance the value of the firms that they manage? In addition, what forms of CEO human capital serve as screening devices that are intended to maximize firm outcomes (with the intent to resolve adverse selection problems)?

Institutional investors and shareholders have recently shown increasing interest in the enhanced disclosure of CEO characteristics and CEO succession planning. In response, the SEC provided guidance by publishing Staff Legal Bulletin 14E (SLB 14E) in October 2009. Firms are now required to disclose strategic decisions that are based on CEO succession decisions and CEO characteristics because CEOs have different attributes that influence the human capital accumulated by firms. Recent decades have prompted awareness of the specificity of CEO human capital. Previous studies provide theoretical underpinnings for the distribution of CEO human capital in firms (Gabaix and Landier 2008). Graham, Li, and Qui (2010) suggest that CEO human capital have explanatory power for compensation schemes. Thus, I extend the stream of research devoted to this issue by examining the effect of CEO human capital on firm outcomes.

Previous literature on accounting, strategy, management, and finance focus on incentive contracts in the moral hazard context to explain the determination of CEO compensation that is contingent on firm performance.² In this stream of literature, however,

¹ CEO human capital is defined as the abilities, knowledge, skills, and experiences that incumbents bring to their work (see Schultz 1961; Becker 1962; Agarwal 1981).

² Real-world pay-for-performance sensitivity, however, has not been documented as comprehensively as expected in the agency theory literature (Jensen and Murphy 1990; Gibbons and Murphy 1990; Murphy 1999;

CEO human capital is assumed an exogenous parameter. Using these models to compare different executive pay levels and firm outcomes across firms over time is therefore impossible. Given that little empirical evidence exists on the effect of CEO human capital on CEO compensation and firms (Dutta 2008; Frydman 2010), the model in the current study provides new insights by including CEO human capital as an endogenous factor. I examine how general human capital and firm-specific human capital are accumulated within a firm. Unlike previous research, the present work more comprehensively explains the overall aspects of CEO human capital through hand-collected observations of CEOs who work at S&P 500 firms over the period 2001–2009.

Upper echelon theory holds that CEO characteristics influence firm decisions and policies, and therefore, the actions adopted by firms, because CEOs influence strategic managerial policies that ultimately affect firm outcomes (Hambrick and Mason 1984). In theory, CEOs with weak human capital misallocate a firm's costly assets and less efficiently oversee operations, thereby diminishing the long-term value of the firm. By contrast, CEOs with strong human capital are expected to use more sophisticated methods, through which they presumably enhance long-term firm value (Graham and Harvey 2002). To maximize overall firm value, therefore, firms must hire CEOs with the skill sets required for effective management. The value of this study is rooted in its explanation of the need for CEOs to understand how they affect the managerial decisions in a firm.

Human capital theory indicates that human capital is a critical factor in explaining how people develop their abilities and accumulate their experiences for professional growth and

Core and Guay 1999; Ittner et al. 2003), and pay-for-performance prevails when the level of compensation is examined. For example, the shareholders' wealth in S&P 500 firms has decreased more than CEO compensation in these firms between 2004 and 2007. This decrease indicates that pay-for-performance does not fully explain the complete dynamics of the determination of CEO managerial human capital. As a result, the determinants and objectives of appropriate CEO managerial characteristics for firms remain ambiguous and understood only partially because extant literature has primarily investigated firm-level performance variables and fail to consider managerial human capital.

contributions to an entity (Schultz 1961; Becker 1962; Mincer 1974). This theory shows that effective CEOs have professional knowledge, experience, and expertise that are contributory to firms and society. Murphy and Zabojsnik (2008) and Frydman (2010) provide evidence that CEO human capital is tenure invariant, and suggest that firms pay a premium on managerial human capital.

To gain an understanding of how CEOs perceive their roles in a firm, I use two sets of proxies to depict CEO human capital (Becker 1962; Harris and Helfat 1997). The first is general human capital, which captures the characteristics of CEOs' managerial positions and professional profiles in the firms that they previously worked for. It includes the characteristics of the CEOs' previous positions, education, experience in the positions, and press coverage while employed in the companies. The second proxy is firm-specific human capital, which includes the characteristics that capture the measurable outcomes of CEOs' actions at their current employers. It also includes firm-level measures of performance and the quality of financial performance over managerial tenure. These measures represent the objective outcomes of CEO human capital; I assume that CEOs with strong human capital deliver higher performance and produce better value-enhancing strategic decisions than do CEOs with weak human capital.

One may argue that the differences in general human capital and firm-specific human capital affect various strategic decisions. Thus, I investigate the effect of CEOs with both perspectives. General human capital is applicable across organizations, indicating that it is broadly valuable in the executive labor market or in all complex corporations; it is not specific to a certain organization (Becker 1993). The value of firm-specific human capital, on the other hand, is limited to within a particular area or a particular organization (Becker 1993). These human capital estimates enable the approximation of individual CEO human

capital from a CEO's realized performance on a fiscal year basis. According to human capital theory, compensation schemes are related to the human capital that incumbents bring to their office (Agarwal 1981). Similarly, the human capital-based view highlights the relationship between CEO human capital and compensation schemes (Castanias and Helfat 1991).

Two related social science theories—human capital theory and upper echelon theory—which have been applied to CEO human capital research suggest that such human capital creates firm value when applied to the efficient operation of a firm (Hambrick and Mason 1984; Harris and Helfat 1997; Murphy and Zabochnik 2008; Frydman 2010). These two theories have been useful in explaining why CEO human capital becomes more difficult to create or replace over time, and why it is considered valuable from a capability perspective (Teece, Pisano, and Shuen 1997). The present study uses these theories as the framework in examining whether human capital enables better prediction of when such backgrounds can be translated into competitive human capital (Hambrick and Mason 1984; Teece et al. 1997). Taking an economics approach to this research, as well as using human capital theory and upper echelon theory, I predict that CEO human capital influences both operations-related management decisions and compensation schemes.

The results are consistent with my predictions. That is, general (firm-specific) human capital has a statistically significant effect on CEO fixed compensation (or contingent pay), after firm-level performance variables have been controlled for. The results are consistent with human capital theory, suggesting that CEO human capital explains increments to CEO compensation schemes. I also find that return on assets (ROA),³ or stock returns with respect to current and previous periods' total assets, changes as human capital measures are included

³ ROA is defined as EBITDA/lagged assets.

as exogenous parameters in the traditional pay-for-performance relationship. Specifically, when human capital variables are included, the correlation between CEO fixed compensation and past ROA performance increases, whereas that between fixed compensation and current ROA performance decreases. Even for contingent compensation, the effect of current ROA diminishes after CEO human capital variables are included as exogenous parameters. In addition, the results indicate that externally hired CEOs negotiate compensation packages and attempt to secure fixed incomes when they are hired. In nearly every instance, the estimated coefficients reflect the predicted values and the results are generally both statistically and economically significant.

Consistent with Frydman (2010), among human capital measures, general human capital is strongly associated with research and development (R&D) expenses and firm growth. I also find that general human capital is negatively associated with the cost asymmetry that stems from selling, general, and administrative (SG&A) expenses. In the presence of human capital, the relationship between CEO compensation and different types of human capital is consistent with optimal contracting and the view that the decisions on value-enhancing activities are affected by the human capital possessed by CEO candidates. In line with my expectations, I show that CEO human capital is positively related to firm performance. Overall, I find that the importance of human capital to a firm supports the validity of human capital theory and upper echelon theory. The results also show that human capital variables are strongly associated with CEO power, suggesting new research avenues in the area of corporate governance.

Using the hand-collected data, I examine whether the proxies for human capital are correlated with the other measures of managerial ability used in the literature (Gabaix and Landier 2008) and with market reactions to appointment announcements (Hayes and Schaefer

1999; Chang, Wu, and Wong 2010) and board characteristics (Khurana 2002). I also investigate how human capital measures influence value-enhancing activities, firm growth, and pay premiums in a firm. The hand-collected personal data on CEOs are obtained from Marquis Who's Who.

This study intends to fill the gap in extant management accounting literature by looking into the relationships among human capital, compensation schemes, and firms' strategic decisions. It makes two major contributions. First, it identifies and explores whether CEO compensation schemes are efficiently determined by CEO human capital. The results show that different types of CEO human capital are associated with (i) compensation schemes (fixed vs. contingent pay), (ii) managerial decisions, and (iii) firm growth. This study therefore complements those of Milbourn (2003), Rajgopal, Shevlin, and Zamora (2006), and Francis, Huang, Rajgopal, and Zang (2008), who examine the relationship between a few proxies for managerially perceived CEO human capital and total compensation. As for compensation schemes, the current work breaks down CEO compensation schemes into fixed and contingent pays because multi-dimensional human capital differentially affects CEO compensation schemes, and thus, the sensitivity to unequal pay-for-human capital. I also extend the works of Frydman (2010) and Aivazian, Lai, and Rahaman (2011), who investigate the comparative influence of managerial human capital on CEO compensation schemes. I treat CEOs as independent of firms in an attempt to draw inferences about the potential causal link between CEO human capital and compensation schemes.

The second distinguishing characteristic of this study is that it provides advocate evidence for upper echelon theory literature, in which various forms of human capital variables are used to ascertain whether top managers are key to determining important firm outcomes. Although previous studies acknowledge the effect of CEO human capital on firms

(Aivazian et al. 2011; Kaplan et al. 2011), to the best of my knowledge, they have not comprehensively considered the role of CEO human capital in firm decisions related to value-enhancing activities. By investigating how CEO human capital influences value-enhancing activities (such as R&D spending and SG&A costs), this study expands our understanding of the effect of human capital specificity, an area of limited research. This study is a first attempt to investigate and document how different types of CEO human capital influence a firm's strategic cost decisions on maximizing firm value. From a practitioner's standpoint, this study provides evidence on the potential influence of different types of human capital on the strategic policies of a firm by linking the multiple specificity of CEO human capital and by extending the literature on the role of CEO characteristics (Graham et al. 2010). This study also complements the evidence provided by Murphy and Zbojnik (2008) and Frydman (2010), who indicate that the nature of CEO human capital has changed over decades and that general human capital has recently become more important than firm-specific human capital.

Overall, I document that CEO human capital is an important source of variation in firms' strategic decisions on value-enhancing activities. This dissertation complements and extends the stream of research by focusing not on any single aspect of CEO human capital (e.g., reputation, education, experience), but on the overall effect of CEO skill sets. Taken together, the results presented here demonstrate that CEO human capital is a powerful driver of firms growing concern over accounting, finance, economics, management, and organizational theories.

The remainder of this dissertation is organized as follows. Chapter 2 presents the developed hypotheses and provides the design of the empirical tests. Chapter 3 discusses the sample and the details of the empirical measures of CEO human capital. Chapter 4 provides

the empirical results and Chapter 5 presents the summary and recommended research directions.

Chapter 2: Background and Hypotheses

2.1 Introduction

This dissertation extends previous research on management accounting and management by approaching human capital from a human capital perspective. On the basis of the arguments presented in Chapter 1, I measure human capital using the various CEO characteristics related to the skills and knowledge that they have acquired through schooling, work experience, and training. This chapter presents the main hypotheses that are based on relevant literature on accounting, management, finance, and economics.

2.2 Human Capital Theory

2.2.1 Human Capital

The term “human capital” was first used by Schultz (1961). In the same year, Weisbrod (1961) develops the first conceptual framework for estimating the value of human capital. Later, Becker (1964) establishes a model of individual investment in human capital. From this perspective, human capital is regarded as similar to the physical means of production, indicating that human capital is interpreted as pertaining to all accumulated activities that influence future real income through the embedding of resources (Becker 1962). Therefore, CEOs make up an important part of the labor force even though they represent a small proportion of the personnel in their firms. CEO human capital is important because individuals tend to differ in their preferences, risk-aversion behaviors, skills, and opinions. Thus, firms’ strategic policies are likely to depend on and vary with the specificity of CEO human capital.

Human capital theory maintains that knowledge increases individuals’ cognitive

abilities, leading to engagement in more productive and efficient activities (Becker 1964). According to this theory, compensation is related to the different skills and experiences of top executives (Agarwal 1981). Aivazian et al. (2011) use the interactions between general managerial skills and firm-specific skills to study various trends in the US executive labor market. They show that CEO human capital affects firm performance, and that better performance also explains the excess in CEO compensation relative to a typical firm in the industry. Fama (1980) suggests that managers “rent out” their human capital to a firm, and the measure of their human capital reflected by the managerial labor market is likely to depend on the success or failure of the firm. Thus, I expect a positive correlation among CEO human capital, compensation schemes, and value-enhancing investments. However, previous literature suggests that managerial human capital has components that fit in different human capital classifications. I discuss the two dimensions of human capital in the next section (Becker 1962; Harris and Helfat 1997).

2.2.2 General Human Capital

All CEOs have general human capital (e.g., innate abilities) that is transferrable to any organization and across firms or industries. General human capital is valuable because it integrates new knowledge and new experience, which can enhance a firm’s survival in and adaptation to a new environment (Dimov and Shephard 2005; Frydman 2010). I consider four aspects of general human capital that have been documented in previous literature (Becker 1964; Harris and Helfat 1997; Murphy and Zabojsnik 2004, 2007; Frydman 2009): experience, education, age, and reputation.

Experience plays a critical role in intellectual performance. It facilitates the integration and accumulation of new knowledge, as well as adaptation to new situations. Therefore,

previous experience in different organizations enables a CEO to accumulate new knowledge; such experience is therefore a component of human capital. Experience can be accumulated through practical learning that takes place in various job positions that the CEO has held, such as that occurring in the finance, accounting, marketing, R&D, and law fields. Thus, broad labor market experience and specific vocationally oriented experience are theoretically predicted to increase general human capital (Becker 1964). Neal (1995) also finds that a worker's previous career path (law, finance, accounting, technological, and other management-related careers) is a proxy for his/her human capital. Black and Lynch (1996) find that if workers' specializations change as they take on new jobs, their human capital is not as valuable as that of other workers. If CEOs shift industries, then their human capital is no longer specific but general—a transition that visibly affects firm growth. I argue that CEOs who have worked in multiple firms and industries throughout their careers have more general human capital than those who have worked in one firm during the entirety of their careers. The rationale is that such CEOs have acquired a greater breadth of knowledge. Thus, the number of career paths, the number of years during which CEOs held a CEO position during their careers, and previous experience in different firms and industries are expected to be important components of general human capital.

Education is an important predictor of future success (Davidsson and Honig 2003). A number of studies reveal that CEO performance is associated with higher levels of education, such as master's or bachelor's degrees (Bertrand and Schoar 2003; Palia 2001). Economic studies based on the functions of human capital earnings also suggest that a CEO's level of education is associated with increased compensation (Card 1999). Firms allow CEOs to choose their human capital composition and show that individuals invest more in acquiring general managerial skills (e.g., obtaining an MBA or JD degree) as the importance of general

human capital increases. Consequently, the number of disciplines studied by CEOs during their careers and the highest degrees that they earn are also expected to be important components of general human capital.

Age⁴ is another indicator of the accumulation of general human capital. Two opposite interpretations of age as an indicator exist. Young CEOs are reluctant to jeopardize their future compensation, therefore avoiding risky activities. This tendency indicates that the compensation structures of CEOs change throughout their careers. By contrast, Bertrand and Mullainathan (2003) argue that CEOs have preferences for quiet lives, a tendency that is likely to increase with age. As CEOs grow older, energy levels decline. CEO human capital is likely to change with age. Thus, psychological and physiological changes occur with the aging of CEOs, a situation that translates into changes in CEO human capital (Kovalchik et al. 2005). Age often signifies more knowledge, experience, wisdom, and established social networks (Cohen and Dean 2005). Non-work-related life experiences also influence an individual's work-related knowledge and abilities over time (Tesluk and Jacobs 1998). A strong positive relationship between age and knowledge level exists (Kanfer and Ackerman 2004). As CEOs age, they are therefore likely to accumulate more knowledge and work experiences, thereby enhancing their stores of human capital necessary to navigate and address new situations.

Since the late 1980s, the increased stock ownership of large institutional investors has forced CEOs to lead their companies' investor relations efforts, directly communicating with shareholders and institutions. Effectively accomplishing this responsibility necessitates that

⁴ Age is correlated with CEO performance (Francis et al. 2008). CEO compensation is largely tied to firm size. In addition, CEOs want to enjoy a higher level of compensation. Thus, I believe young CEOs have strong incentive to pursue firm growth because they have longer career horizons and exceptional charisma or leadership skills that characterize those who become CEOs at a young age. Physiological or psychological changes can also diminish the inclination of older CEOs to pursue firm growth. I present evidence that CEO human capital have direct causal effects on firm growth and strategic policies.

CEOs be experts in communicating with both print and broadcast media outfits. Previous literature (Milbourn 2003; Rajgopal et al. 2006; Francis et al. 2008) has used CEO reputation in both print and broadcast media as a proxy for general human capital. Malmendier and Tate (2009) argue that a CEO can be regarded as a celebrity when he/she satisfies investors' and analysts' expectations on future firm performance. The more often this feat is accomplished, the greater the increase in celebrity status. Reputed CEOs are considered capable of avoiding profit losses because they have more human capital than CEOs without established reputations. If reputed CEOs misjudge business opportunities, then they have more to lose (Francis et al. 2008). CEOs are concerned about how their performance affects the long-term value of their human capital or reputation in the executive labor market (Fama 1980), in addition to how it affects their compensation. Previous research gives rise to the interesting issue of how CEOs build their reputations; CEOs with strong general human capital are more likely to care about such reputations.

2.2.3 Firm-specific Human Capital

Numerous studies have estimated the effect of firm-specific human capital on individual wage growth (Altonji and Shakotko 1987; Altonji and Williams 2005). Firm-specific capital develops from understanding an organization's unique context, history, culture, personnel, capabilities, and weaknesses (Bailey and Helfat 2003). Although general human capital increases firm productivity in a similar manner, how a CEO's innate general human capital fits into a firm upon hiring remains uncertain. By definition, firm-specific human capital makes CEOs more productive only in the firms that they currently work for, indicating that firm-specific human capital does not affect CEO productivity in other firms and is non-transferable. This differentiation between general and firm-specific human capital

is important in understanding job mobility behavior, performance, and CEO wage growth (Altonji and Williams 2005). I consider three different attributions of firm-specific human capital: family ownership, nature of hiring, and tenure. In what follows, I discuss how these attributions are associated with compensation.

Family members (founders, descendants, and relatives) control 36% of S&P 500 firms (Anderson and Reeb 2003). Thus, families own and control a considerable number of publicly held firms. Similarly, family ownership is considerable in private-owned firms. Therefore, family CEOs possess substantial firm-specific human capital. They have an in-depth understanding of a firm's history, personnel, culture, internal strengths, and weaknesses, thereby limiting their value outside the firm. These CEOs more strongly affect decision-making on firm performance than do externally hired CEOs. For example, family CEOs perform better than do other CEOs because they derive considerable personal satisfaction from the success of the firm (James et al. 1997; Palia and Ravid 2002) and face higher levels of potential dishonor should the firm fail (Kandel and Lazear 1992). The loyalty established with key family stakeholders is also more easily transferred to family CEOs (Donnelley 1964). An additional benefit of family CEOs is that by virtue of constant exposure to the day-to-day business of the firm, they have more firm-specific human capital than do outsiders (Donnelley 1964). Anderson and Reeb (2004) find a positive correlation between founding family ownership and firm profitability and M/B ratios; the authors also find a positive correlation between these performance measures and family CEOs, contingent on family ownership. These statistical findings indicate that the family characteristics of family CEOs are highly closely related to firm-specific human capital.

With regard to the match between the human capital of external CEO candidates and a firm's needs, information asymmetry affects the choice between internal promotion and

external hiring (Bailey and Helfat 2003). Such an effect is driven by the notion that internal candidates with better firm-specific human capital are more strongly perceived as having the human capital necessary to become CEOs than are external candidates (Milbourn 2003; Rose and Shepard 1994). Hermalin and Weisbach (1988) and Agarwal and Knoeber (2001) find evidence that firms optimally choose directors on the basis of firm-specific characteristics because such directors know their firms' internal strengths and weaknesses. This choice implies that if promoted CEOs come from within firms, their firm-specific human capital potentially has more value than that of externally hired CEOs. In addition, if externally hired CEOs have no job experience in the industries where the current firm operates, then the new externally hired CEOs lack firm-specific human capital. In sum, a CEO's nature of hiring is an important indicator of firm-specific human capital.

The length of CEO tenure within a firm enables a CEO to better understand the firm's history, employees, culture, internal strengths, and weakness. Thus, CEO tenure can be viewed as a determinant of firm-specific human capital. As CEO tenure within a firm increases, CEOs not only acquire knowledge of the firm's cultural tendencies and weaknesses, but also understand top-level executives' personalities and potential for opportunism (Rajgopal et al. 2006; Francis et al. 2008).

Finally, previous theoretical and empirical studies elucidate the effect of firm size on changes in CEO compensation package (Rosen 1982, 1992). The current study explores the empirical relationship among the scope of CEO human capital, the extent to which a firm engages in a diverse set of businesses, and a firm's CEO compensation schemes. This relationship is important because firm size is expected to be related to CEO human capital. Lambert et al. (1991) find a statistically significant but considerably small correlation between changes in top management compensation and firm size. The literature reveals

various rationales for this association. First, large firms are more willing to compensate CEOs because many difficulties confront the management of large firms. Second, boards may agree to hire CEOs who expand firm size and justify higher pay on the basis of greater managerial demands or because the complicated management of a large firm requires greater skill. Gabaix and Landier (2008) provide evidence that CEOs with strong human capital seek employment at large firms because they can add more firm value. CEOs are paid more as companies expand, suggesting that changes in CEO compensation schemes depend both on changes in firm size and the extent of firm diversification. Thus, firm size can be an indicator of CEO human capital.

2.3 Compensation Schemes

CEO compensation schemes are relevant to assessing the level of CEO human capital that incumbents carry to a firm (Agarwal 1981). Some scholars suggest that CEO equity-based pay is more important than CEO cash-based pay, accounting for nearly 90% of a CEO's total compensation (Bebchuk and Fried 2003). By contrast, agency theory scholars argue that because equity-based pay is tied to firm outcomes that are only partly linked to managerial risk preference, such compensation may shift excessive risk onto already under-diversified managers (Beatty and Zajac 1994; Eisenhardt 1989). These scholars contend that high proportions of equity-based pay are unrelated to CEO human capital. Rather, such proportions are related to a CEO's risk aversion and fortuitous decisions, which lead to preferences that reduce managerial risk, such as pay-risk sensitivity (Amihud and Lev 1981; Huddart and Lang 1996).

Compensation committees generally provide CEOs a premium of additional cash-based pay on top of increases in equity-based pay (Murphy 1999). Among compensation schemes, cash-based pay is intuitively a good measure of a CEO's human capital. Agency theory scholars also suggest that cash-based pay is an efficient sorting mechanism for attracting and retaining CEO talent (Hall and Murphy 2003; Murphy and Zábojník 2004). Among compensation schemes, therefore, cash-based pay is a factor that should be considered in evaluating CEO human capital.

2.4 Hypotheses Development

Despite efforts by the SEC to improve the reportage of CEO characteristics and CEO human capital in financial statements, many firms disclose little about their CEOs. This research is motivated by the belief that an improved understanding of CEO human capital can lead to more effective firm decisions and performance. A firm's human capital should be the most important source of the central considerations in formulating firm decisions, upon which the firm can frame its strategy; it should also be a primary driver of profitability (Grant 1991). In his survey of 95 United Kingdom CEOs, Hall (1992) concludes that the relative contribution of each human capital spells business success. To the best of my knowledge, no study in the US has examined the role of CEO human capital in a firm's decisions on value-enhancing activities.

2.4.1 CEO Human Capital and Compensation Schemes

Human capital theory provides a model for predicting how CEO human capital leads to efficient activities for compensation schemes (Becker 1964; Agarwal 1981). To gain an understanding of how CEOs maximize firm value with different types of human capital and

how they acquire additional compensation for performance research, I raise the following overarching research question:

What CEO human capital-induced effects on human capital and compensation schemes have not been identified in the literature?

To answer this question, I take CEO human capital as an exogenous parameter, and draw on economic theory (human capital theory) and social science theory (upper echelon theory) to develop my hypotheses.

Previous empirical studies primarily examine the relationship between the level of CEO compensation and firm performance (e.g., Ross 1973; Mirrlees 1976; Holmstrom 1979). Many of these studies reveal mixed relationships between the aforementioned factors (e.g., Jensen and Murphy 1990; Gibbons and Murphy 1990; Murphy 1999; Gaver and Gaver 1998; Core and Guay 1999; Bushman and Smith 2001; Ittner, Lambert, and Larcker 2003; Murphy and Oyer 2003), but do not investigate the interaction between CEO human capital and CEO compensation schemes in relation to firm performance.

That pay-for-performance sensitivity does not fully explain the complete framework of CEO compensation is not a surprising finding (Tosi, Misangyi, Fanelli, Waldman, and Yammarino 2000; Bebchuck, Grinstein, and Peyer 2010; Fahlenbrach and Stulz 2009) because firm performance is a function of executives' decisions and human capital (Yermack 1997). To fill the gap in pay-for-performance research, firms must weigh the necessary attributes that CEO human capital contributes to firm performance and value-enhancing activities. Upper echelon theory helps explain the influence of a CEO on organizational development, thereby reflecting the importance of CEO human capital to a firm (Boal and Hooijberg 2001; Hambrick and Mason 1984; Hillier and Mccolgan 2009). According to this

theory, a CEO has different types of human capital that affect a firm's characteristics. Libby and Luft (1993) and Gabaix and Landier (2008) propose a model of how ability, experience, and knowledge (human capital attributes) interact to influence the of compensation and decision performance of a firm CEO. A CEO who makes good decisions, such as increasing shareholder wealth, should be rewarded with compensation. Presumably, they more than likely increase their human capital as they make such decisions. In sum, firms must be conscious of intangible factors because CEOs are compensated by both pay and increases in accumulated human capital. Such intangible factors include the quality of a firm's products/services, employees, competition in the market, and the satisfaction of service quality as affected by CEO human capital.

Recent research points to a need to expand the research agenda related to the effects of human capital. Graham et al. (2010) find that CEO human capital explains most of the variations in total CEO compensation. Kaplan et al. (2011) also show that CEO human capital is an important factor associated with firm performance and equity compensation. These studies imply that the compensation schemes of firms serve as screening devices for attracting and retaining CEOs with strong human capital; such devices are important to guaranteeing firm performance (with the intent to resolve adverse selection problems).

Human capital theory holds that firms should be willing to pay high compensation to attract more talented CEOs, whose strong human capital improves performance and increases firm value. Murphy and Zabojnik (2008) find that CEOs who are perceived as having strong human capital receive high total compensation. Spence (1973) reveals that compensation schemes are associated with human capital indicators, such as professional background or education, which are reflective of a CEO's ability to manage an organization. Human capital theory therefore predicts that executives are rewarded a premium for their superior skill sets.

Indicators that reflect general human capital are also indicative of a CEO's innate ability because general human capital is developed in various organizations across periods (Holmstrom 1979). This finding implies that a compensation scheme is an increasing function of its ratio with respect to a CEO's general expertise in the labor market. Thus, general expertise is appreciated in the labor market because a CEO's performance is rewarded with future increases in compensation. Conversely, a CEO who performs poorly is not rewarded. Given this backdrop, I expect general human capital to be positively associated with fixed pay (reservation wage level) because a CEO's compensation scheme is hedged by fixed pay, which is reflective of a CEO's desire for low-risk compensation. A CEO may also be reluctant to leave a position of relative security without guarantee of payoff compensation. In sum, a high fixed pay is a tool for attracting and retaining CEOs with strong general human capital. I test whether the composition of general human capital is a determinant of fixed compensation.

Previous studies indicate that compensation contingent on performance plays a more significant role in knowledge-based firms, such as information technology (IT), biological, and chemical firms, than in traditional firms because although general human capital tends to be transferable, firm-specific human capital is unlikely to be transferred across firms (Murphy and Zábojník 2008; Ittner et al. 2003). CEOs with firm-specific expertise have little bargaining power in the labor market given that such expertise may not be readily applicable in another firm. Consequently, incentive pay is correlated with numerous firm-specific abilities. I therefore contend that CEOs with more firm-specific expertise are more willing to receive higher levels of contingent pay.

In this regard, CEOs with more general expertise should have high fixed pay and those with more firm-specific expertise should receive high incentive pay. I postulate that different

monitoring incentives and capabilities correspond with CEOs' general and firm-specific expertise; thus, each type of human capital has different effects on CEO compensation schemes. On the basis of these differences, I expect CEOs to enhance their general expertise in relation to fixed compensation and their firm-specific expertise in relation to incentive compensation. The discussion above is summarized in the first hypothesis set:

H1a: General human capital increases fixed CEO compensation (salary compensation), but not bonus compensation (contingent compensation).

H1b: Firm-specific human capital increases bonus compensation (contingent compensation), but not fixed compensation (salary compensation).

To validate the hypothesis set, I regress CEO compensation on human capital variables and firm characteristic variables as follows:

$$\text{Log (Salary)}_{it} = \beta_0 + \beta_1 \text{Firms Characteristics}_{it} + \beta_2 \text{HumanCapital}_{it} + \beta_3 \text{Year Control}_{it} + \beta_4 \text{Industry Control}_{it} + \beta_5 \text{Firms Control}_{it} + \varepsilon \quad \text{--- 1(A)}$$

$$\text{Log(Bonus)}_{it} = \beta_0 + \beta_1 \text{Firms Characteristics}_{it} + \beta_2 \text{HumanCapital}_{it} + \beta_3 \text{Year Control}_{it} + \beta_4 \text{Industry Control}_{it} + \beta_5 \text{Firms Control}_{it} + \varepsilon \quad \text{--1 (B)}$$

I expect the variables that reflect general (firm-specific) human capital to have a positive effect on fixed (contingent) CEO compensation.

2.4.2 Outsider Human Capital and Compensation Schemes

Labor economics literature has recently revealed that general human capital has become increasingly crucial to corporate decisions. The literature also suggests that compared with internally promoted CEOs, externally hired CEOs are expected to carry more general expertise. Huson et al. (2001) provide that outside succession has increased in the mid-1990s compared with the early 1970s. Similarly, Khurana (2002) provides evidence that in the 1990s, at least one-third of all CEO successions in large firms are outside successions. In October 2009, the SEC responded to these issues by issuing SLB 14E, which requires companies to disclose the proposal for a CEO succession process, including CEO characteristics and corporate strategic policies. In general, this policy means that the SEC allows for the scrutiny of corporate governance as regulators and shareholders focus on CEO succession. The disclosure of a firm's CEO succession process for an internally promoted or externally hired CEO is important to the firm's human capital and compensation schemes. In terms of outside succession, Bertrand and Scholar (2003) indicate that CEOs have high general expertise, which they carry as they change firms. The authors also find that general human capital is important to firm performance and compensation schemes because firm-specific human capital is inapplicable to other firms when CEOs move.

If a CEO's expertise is largely firm-specific, he/she finds limited outside job opportunities because general expertise more strongly corresponds with greater executive job demands (Hambrick 2007). Thus, the CEO is in an inferior bargaining position, and therefore belongs under a low reservation wage classification (Jensen 1993; Bebchuk and Fried 2003). The learning hypothesis about CEO human capital (Murphy 1986) holds that

CEOs' firm-specific managerial expertise increases as tenure increases because a firm's environment is less transparent. That is, an internally promoted CEO with considerably firm-specific expertise prefers to receive incentive pay because he/she has longer tenure and more firm-specific expertise.

I model initial compensation premium for external versus internal hiring of CEOs as a tradeoff between general and firm-specific skills. Rose and Shepard (1994) show that externally hired CEOs receive lower salaries and bonuses than do internally promoted CEOs. Their finding is consistent with fat cat theory,⁵ which states that internally promoted CEOs earn more than do externally hired CEOs because the former have closer ties with their companies' boards of directors (BODs). Murphy and Zabochnik (2008) find contrasting results. That is, externally hired CEOs earn approximately 15.3% more than internally promoted CEOs. This premium for external hires has also increased over time, from 6.5% in the 1970s to 17.2% in the 1980s and to 21.6% in the 1990s. Malmendier and Tate (2009) find that the strong human capital of CEOs from outside firms is often associated with inferior future operating and stock performance. Thus, general human capital tends to produce an initial fixed pay premium for an externally hired CEO in the form of non-contingent pay because other forms of pay inadequately compensate an externally hired CEO for the increased risk of inferior future performance. Such a CEO is likely to negotiate pay packages and attempt to secure fixed pay when he/she is hired because he/she has more substantial general expertise, placing him in the best bargaining position.

The CEO succession process of a firm is likely to influence the compensation schemes established by the firm in the event that the CEO candidate does not work out. Therefore, contingent pay increases the downside risk of potential poor firm performance by the

⁵ Murphy and Zabochnik (2004), "Fat cats feeding: Executive pay," *The Economist*, 11 October 2003, p. 64.

externally hired CEO because of lack of firm-specific expertise. Guaranteed fixed pay can compensate an externally hired CEO for the same reason. I posit that externally hired CEOs have greater general expertise than do internally promoted CEOs. Thus, the nature of external CEO hiring is positively associated with general human capital and positively affects compensation level. I hypothesize that:

H2a: Newly hired external CEOs are more likely to receive higher fixed compensation than are new internally promoted CEOs.

Black and Lynch (1996) find that when workers' change areas of expertise, their accumulated human capital can be inferior to that of other workers in these new fields. By extension, if CEOs change industries, their accumulated human capital becomes the general type (instead of firm-specific), which can affect the growth of the firm to which the CEO transferred. However, the results on CEO successions are mixed for CEOs who are externally hired to replace poorly performing CEOs. That is, those who switch industries are more likely to bring low general expertise to new jobs. In this case, the externally hired CEO who switches industries loses not only the future benefits that he/she can derive from previous firm-specific expertise but also those stemming from general expertise that is applicable within the industry. Specifically, changing industries can affect CEOs who work in knowledge-based sectors, such as the finance, IT, biology, and chemical industries (Malmendier and Tate 2009). On this basis, I develop the following hypothesis:

H2b: New externally hired CEOs transferring from the same industry are more likely to receive higher base compensation than those transferring from another industry.

To verify H2b, I add the indicator variables “external hires” and “industrial changes” to the original models. I expect external hires (industrial changes) to have a positive (negative) influence on fixed CEO compensation. Therefore, CEOs with strong general expertise have high fixed compensation (H1a and H2a) and CEOs with strong firm-specific expertise have high incentive compensation (H1b and H2b).

$$\begin{aligned} \text{Log}(\text{salary})_{it} = & \beta_0 + \beta_1 \text{ExternalHires}_{it} + \beta_2 \text{IndustryChange}_{it} + \beta_3 \text{Firms} \\ & \text{Characteristics}_{it} + \beta_4 \text{HumanCapital}_{it} + \beta_5 \text{Year Control}_{it} + \beta_6 \text{Industry Control}_{it} + \varepsilon \end{aligned}$$

---(2)

2.4.3 CEO Human Capital, Innovation, and Firm Growth

R&D and innovation are two of the most critical decisions that must be addressed by a CEO. These activities considerably influence future firm growth over the long run (Scheerer 1984). Moreover, innovation performance is driven by the CEO, whose compensation schemes are affected by the success of a firm’s investments. The literature documents that R&D spending represents value-enhancing investments and therefore positively affects future operating income because such spending accounts for 21% of the total expenses of S&P 500 firms (Lev and Sougiannis 1996). Barker and Mueller (2002) examine the relationship between CEO background and R&D spending. The authors find that CEO education does not affect R&D spending but that considerable increases in R&D spending are found in firms with CEOs who have a science degree. Some previous studies examine how CEOs influence R&D spending and show that firm performance is affected by the quality of CEO expertise in relation to R&D and innovation (Murphy and Zimmerman 1993). These studies indicate that weak innovation performance is affected by only weak internal governance or irrational

managerial optimism (Jensen 1993). To the best of my knowledge, no research has examined the effect of CEO human capital on innovation performance.

Upper echelon theory maintains that a CEO has the organizational power to influence R&D spending because he/she is the central strategic decision maker. The theory predicts that a CEO with an R&D background would invest more heavily in R&D; the rationale for such a decision is that the most important human capital plays a critical role in creating and sustaining firm growth. However, an equally plausible situation is that a firm that invests heavily in R&D hires a CEO with an R&D background. On the basis of this result, we cannot determine a clear indication of whether R&D investment decisions necessarily depend on CEO human capital (Hambrick 2007). Furthermore, although firm performance around the time of CEO turnover, quality of governance, and a CEO's decision policies on innovation performance have received attention from previous research, the effect of CEO human capital on innovation performance has not been previously studied. I therefore ascertain whether examining the significant associations between CEO human capital and R&D spending is an effective initial approach.

Barker and Mueller (2002) show that general CEO human capital—specifically R&D career, marketing career, and educational degree—positively affect R&D innovation performance. Because researchers have used R&D expenses as a proxy for firm innovation (Titman and Wessels 1988; Chan et al. 2001; Barker and Muller 2002), my analysis focuses on R&D expenses devoted to firm innovation. I also distinguish between general human capital and firm-specific human capital in relation to innovation performance. Frydman (2007) states that general human capital is more important than firm-specific human capital for firms because firms develop in a complex manner and environments considerably change in the long term. On this basis, I formulate the following hypothesis:

H3a: CEOs' general human capital is positively associated with R&D expenses.

Agency theory suggests that CEOs prefer less work and suboptimally invest in innovation performance, even though compensation schemes and turnover are intended to mitigate these behaviors. Career concerns can also alleviate agency problems. A CEO who has worked for his/her current employer for a long period and has more firm-specific human capital is expected to infuse more investments into innovation than are other CEOs. This position is accurate even though most firms prefer to hire CEOs with strong general human capital (Fama 1980). Learning on the job during a CEO's tenure encourages the CEO to invest in his/her abilities, a behavior that further enables him/her to expand his/her firm-specific human capital. A CEO with firm-specific human capital is more likely to pursue relatively risky R&D and innovation activities because he/she is familiar with a firm's unique context, history, culture, personnel, capabilities, and weaknesses (Bailey and Helfat 2003). Thus, I propose the following hypothesis:

H3b: CEOs' firm-specific human capital is positively associated with R&D activities.

H3b is tested by the following model:

$$\Delta R\&D/Sales_{it} = \beta_0 + \beta_1 FirmsCharacteristics_{it} + \beta_2 \Delta R\&D/Sales_{it-1} + \beta_3 HumanCapital_{it} + \beta_4 YearControl_{it} + \beta_5 IndustryControl_{it} + \beta_6 FirmsControl_{it} + \varepsilon \quad \text{---(3)}$$

CEOs are always confronted with difficult choices and conflicting demands from shareholders and investors. They often feel isolated, unable to share their problems and

concerns with board members or their leadership team without fear of negative emotions. CEOs must be able to direct their firms toward long-term growth and in creating firm value to achieve sustained success.

The literature indicates that management affects firm growth through managerial decisions (Bebchuk et al. 2002; Holmstrom and Kaplan 2001; Bertrand and Schoar 2003; Murphy and Zbojnik 2007; Aivazian et al. 2011). The implication of these studies is that the optimal managerial decisions made by CEOs increase firm growth through CEO human capital perspectives. The influence of CEO human capital on managerial decisions affects firm growth and value creation because CEOs determine decisions regarding appropriate long-term projects, such as R&D initiatives. This influence indicates that the adequate managerial decisions made by CEOs are crucial to the viability and success of firms in many industries. The suboptimal managerial decisions made by CEOs translate to impaired long-term growth and value creation. Thus, the levels of CEO human capital affect optimal managerial decisions on firm growth.

As discussed above, the role of human capital in expanding firms increases with the challenge and complexity of managerial tasks in a firm. Specifically, upper echelon theory suggests that CEO characteristics affect how CEOs assess or interpret their situations, and therefore influence their decisions regarding firm operations. Little research has provided evidence on the correlations between various types of managerial human capital and corporate decisions regarding firm growth. Examples include the relationship between CEO overconfidence and corporate investment (Malmendier and Tate 2005), and that among superstar CEOs, firms, and growth (Malmendier and Tate 2009).

Firms with more growth opportunities require managerial human capital that focuses on making the right investments. Frydman (2007) implies that general human capital is key

to investing in favorable projects as firms develop. As stated in the career concern hypothesis of Gibbons and Murphy (1992), CEOs pursue various careers throughout firm growth by establishing their reputations in different firms with more general human capital. CEOs who possess firm-specific human capital and long-term perspectives may also significantly affect firm growth in the long run. Examining future stock price performance can be problematic because markets anticipate future performance. In validating these hypotheses, sales growth and book-to-market are more relevant to growth opportunities than are profitability measures, such as income measures or accounting returns. Thus, my fourth hypothesis set is stated as follows:

H4a: CEOs' general human capital is associated with growth opportunities.

H4b: CEOs' firm-specific human capital is associated with growth opportunities.

Here,

$$\begin{aligned} \text{Log}(\text{Sales}_{it} / \text{Sales}_{it-1}) = & \beta_0 + \beta_1 \text{HumanCapital}_{it} + \beta_2 \text{HumanCapital}_{it} * \log(\text{Sales}_{it-1} / \text{Sales}_{it-2}) \\ & + \beta_3 \text{FirmsCharacteristics}_{it} + \beta_4 \text{Year Control}_{it} + \beta_5 \text{Industry Control}_{it} + \varepsilon \end{aligned}$$

--- (4)

2.4.4 General CEO Human Capital and Selling, General, and Administrative Costs

SG&A costs are potentially important indicators because the SG&A cost ratio accounts for more than 28% of sales revenue for the sample firms used in this study; the ratio of SG&A costs to sales is also closely monitored by investors and analysts (Wild,

Subramanyam, and Halsey 2003). Lev and Radhakrishnan (2005) argue that SG&A costs include most of the expenditures that generate organizational capital. Abarbanell and Bushee (1997) reveal that the interpretation of increases (decreases) in the SG&A cost ratio is considered an unfavorable (favorable) indicator of changes in future earnings. Since the corporate accounting scandals in 2001 such as Enron and WorldCom, most firms have cut costs as much as possible. History indicates that firms with high gross margins tend to spend more on SG&A than do their counterparts in similar industries. Although some SG&A costs drive gross margin improvement (e.g., infrastructure improvements), many firms likely overspend on SG&A. As one of the largest expense pools for any firm, SG&A represents a key opportunity to improve bottom-line performance. A 5% reduction in SG&A for the companies in the sample would result in an average increase in operating profits of US\$175 million. Optimizing the SG&A cost ratio is consistently a topic of boardroom discussions.

The effects of the lack of adequate human capital attributes, such as insufficient leadership, inability to overcome internal politics, inadequate management, and inability to strike the right balance, provide an important explanation for SG&A cost overruns. This explanation is particularly notable among firms where SG&A costs create low future value (Banker, Huang, and Natarajan 2011). Because SG&A costs capture most overhead costs, CEOs with weak human capital are more likely to increase SG&A costs too rapidly when sales increases or vice versa. Such human capital causes SG&A costs to veer from optimal levels and incurs greater SG&A costs.

I extend my analysis by estimating an SG&A cost model that incorporates various elements of CEO human capital. The fifth research hypothesis examines the role of general CEO human capital in mitigating the effect of overspending on SG&A. The general consensus is that SG&A costs affect a firm's future value and performance; a CEO's general

human capital plays a more important role than does firm-specific human capital in a firm's future value (Frydman 2007). A CEO's human capital highly likely drives SG&A costs to optimal levels from suboptimal levels. Increases in the SG&A cost ratio are treated as evidence that resources are used less efficiently and that CEOs are unable to effectively control costs, whereas decreases in this ratio are applauded by investors and analysts (Abarbanell and Bushee 1997). My research complements the literature in that it shows that human capital can also be a factor in SG&A costs. In sum, I predict that general human capital reduces the SG&A cost ratio. In this regard, I posit the following hypothesis:

H5: The SG&A cost ratio is negatively associated with general CEO human capital, after known firm determinants are controlled for.

Here,

$$\begin{aligned} \log(SG\&A_{it} / Sales_{it} / SG\&A_{it-1} / Sales_{it-1}) = & \beta_0 + \beta_1 \log(Sales_{it} / Sales_{it-1}) + \beta_{2i} \\ & GeneralHumanCapital_{it} + \beta_{3i} GeneralHumanCapital_{it} * \log(Sales_{it} / Sales_{it-1}) + \beta_{4i} \\ & FirmsCharacteristics_{it} + \beta_5 Year Control_{it} + \beta_6 Industry Control_{it} + \varepsilon \end{aligned} \quad \text{--- (5)}$$

2.5 Chapter Summary

This chapter summarizes the relevant literature, as well as presents the theoretical framework of this study and identifies previous research findings that support the hypotheses validated in this dissertation. Previous studies on human capital and performance measurements (Barker and Mueller 2002; Bertrand and Schoar 2003; Frydman 2010; Kaplan et al. 2011; Aivazian et al. 2011) reflect the perspective that human capital is the most important factor in strategic firm policies and long-term firm value. Human capital theory

(Becker 1962, 1993; Murphy 1986; Tesluk and Jacobs 1998) and upper echelon theory (Hambrick and Mason 1984; Teece et al. 1997) are used as the theoretical foundations of the present work. This study provides support for human capital theory in relation to CEOs and upper echelon theory. As presented in the hypotheses, this study aims to examine whether human capital leads to greater compensation schemes and drives firm decisions on value-enhancing investments, and whether human capital affects future firm performance (Lev and Sougiannis 1996). The details are provided in Figure 1. Table 4 summarizes the empirical predictions based on the literature review.

[Insert Figure 1 around here.]

[Insert Table 4 around here]

The next chapter discusses the methodology, which includes the research design, empirical measurements, and empirical tests. The manual data collection process is also discussed.

Chapter 3: Methodology

3.1 Introduction

This study aims to provide an understanding of CEO human capital-related factors that influence compensation schemes and strategic firm decisions. Following previous research on human capital and firm performance, I use human capital as basis for analyzing firm decisions. I hypothesize that CEO human capital serves as an endogenous variable for firms. After controlling for the standard economic determinants of compensation, I find that the proxies for CEO human capital are positively related to firm outcomes, which is consistent with the idea that strong human capital improves firm outcomes. I measure CEO human capital using two sets of proxies: (1) general human capital (characteristics of CEO professional profiles and educational levels) and (2) firm-specific human capital (outcomes of CEOs' actions in current employment). At the end of this chapter, the sample and data sources are described and the measurements of CEO human capital are provided.

3.2 Sample

This study uses 2001–2009 data on S&P 500 companies; that is, 3,364 CEO–firm-year observations for 653 different CEOs. The data are collected from various sources. Some are extracted from databases and others are hand collected.

CEO compensation data are collected from the ExecuComp database. Annual compensation is defined as the value of a compensation package in a given year and is the sum of an executive's salary, bonuses, long-term incentive plans, grant-value of restricted stock awards, and Black–Scholes value of granted options. To adjust for inflation, I calculate all monetary figures in accordance with the 2001 US dollar rate. For the sample firms, I

obtain financial statement data from Compustat and stock return data from CRSP. For the CEOs, I obtain data on CEO characteristics from ExecuComp. I supplement the merged Compustat/CRSP data with manual searches of SEC proxies and 10-K files.

I expect several attributes of CEOs' lifetime experiences to capture the outcomes of their managerial human capital. Given that none of the publicly available databases measure CEO human capital, I focus on the CEOs' educational backgrounds and employment histories. I manually obtain the variables of CEO human capital from the Mergent Online, Hoover's, EDGAR system, and NNDB databases, as well as from BoardEX. I match the CEO information obtained from Compustat (US firms) and the hand-collected data to obtain the characteristics of the firms where the CEOs worked. As expected, high levels of human capital are reflected in strong human capital. Frydman (2010) includes only CEOs' education and occupational experience, whereas I consider job experience across firms and industries, in addition to educational degrees. In particular, the variables in this research focus on CEO lifetime experiences, which are strongly related to the quality of externally hired CEOs (Murphy and Zábojník 2004, 2008).

Using the data that I hand-collected from LexisNexis, Factiva, Mergent Online, and Google, I measure CEO reputation (one type of general human capital) as the manner by which CEOs are assessed by the media; that is, the number of articles containing a CEO's name and company affiliations that appear in major US and global newspapers and newswires in a calendar year. The major US newspapers considered in this study are the Wall Street Journal (both weekday and Sunday editions), the New York Times, the Washington Post, and USA Today. The major international newspapers considered are the Financial Times, the Asian Wall Street Journal, Wall Street Journal Europe, and the International Herald Tribune. Data are collected for each year from 2001 to 2009, during

which the targeted CEO was in his/her position. In this study, press coverage can be restricted to coverage of the CEOs and not necessarily the firms.

Table 1 describes the summary statistics of the compensation, CEO human capital, and firm characteristics of the sample. The table in the Appendix provides the definitions and data sources of all the variables. The CEOs in the sample receive an average of US\$10 million in total compensation, which includes US\$0.93 million in bonuses and \$0.87 million in salaries. The CEOs have 7.8 years of CEO experience and 4.6 different job positions in two different firms. They have 5.8 years' experience as BOD members. They have obtained master's degrees in two disciplines. They are, on average, 55 years old and spend 6.8 years in a given CEO position. About 28% of the CEOs were externally hired and 17.3% work for their own companies. All the variables are Winsorized at the 5th and 95th percentiles.

[Insert Table 1 around here.]

Aside from the CEO characteristics for firm-specific human capital (tenure, internal hires, founder), I measure some CEO attributes for general human capital: CEO age, career path, number of firms, general work experience dummy, experience as a BOD member, educational field, educational level, the age at which the CEO first assumed this position, and reputation. In the tests, I also control for firm characteristics, such as stock return, sales, Tobin's Q, ROA, leverage, R&D, CAPEX, loss, growth, and diversification dummy.

Table 2 shows CEO human capital over the studied period. General human capital and firm-specific human capital steadily increase over time. The table shows a significant

increase in compensation schemes over the studied period. Aside from measuring CEO human capital, I also measure other CEO attributes: external hires and industry changes. Within my analysis, external hires is reflected by a dummy variable that equals 1 if the CEO was externally hired, and 0 otherwise (i.e., internally promoted). Industry change is also a dummy variable that equals 1 if the CEO was hired from an industry that differs from that where the current firms belong, as determined by the four-digit SIC code; this dummy has a value of 0 otherwise.

[Insert Table 2 around here.]

Figure 2 shows the time series observations of changes in externally appointed CEOs from 2001 to 2009. The number of appointed CEOs belonging to outside firms and industries increases over time, indicating that firms are more likely to hire externally than promote within firms. This result can account for the increased demand for managers with strong general human capital. This finding is also consistent with CEOs having more general human capital, which is more transferable across firms and industries than firm-specific human capital.

[Insert Figure 2 around here.]

Figure 3 presents the average years of CEO work experience, experience as a BOD member, and tenure in the current CEO position from 2001 to 2009. The figure shows the increasing importance of experience as a component of general managerial human capital with time during the sample period.

[Insert Figure 3 around here.]

Figure 4 presents other general CEO human capital attributes from 2001 to 2009. As previously stated, general CEO human capital increase over time (Figure 4). The number of career paths, educational fields, and reputation increase over the research period. Educational level, however, increases up to 2004, then decreases and slightly increases before plateauing over the last three years. That CEOs acquire education from various disciplines is not a surprising result. Figure 4 also shows the importance of general managerial human capital in recent decades.

[Insert Figure 4 around here.]

Table 3 shows average compensation scheme and average human capital by industry. I find significant variations across industries in terms of general managerial human capital and in terms of the differences in pay schemes between general human capital (generalist) CEOs and firm-specific human capital (specialist) CEOs. The telecom service industry has

the highest average level of general CEO human capital. This field attaches importance to reputation and educational level; at the same time, it is the industry where CEOs receive the highest average total pay (US\$10.6 million) and highest average total salary (US\$1.1 million). Moreover, the telecom industry shows the largest number of externally hired CEOs. The CEOs in the telecom industry are therefore generalists. This result may be attributed to the fact that this industry rapidly changed with the deregulation of telecommunications in the 2000s. The rapid increase in competition based on technological innovation can increase the demand for managers with general human capital.

[Insert Table 3 around here.]

3.3 Empirical Measurements of CEO Human Capital

A major empirical challenge for a study on the relationship between CEO human capital and outcomes (such as firm growth, enhancement activities, and CEO compensation schemes) is guaranteeing the accurate measurement of CEO human capital. Simple measures, such as CEO age, experience, tenure in the firm, and educational background, are commonly used as proxies for CEO human capital in univariate analysis. For example, Murphy and Zabochnik (2008) argue that the decline in CEO tenure in a firm (as a proxy for CEOs' firm-specific skills) and the increase in the proportion of CEOs with master's degrees (as a proxy for CEOs' general human capital) in recent years support their assumption that general CEO skills have become relatively more important than firm-specific skills. Frydman (2010) collects data about executives' biographical information, including education and career paths, for use as an index of executive general human capital. She argues that this index is

positively associated with the increasing importance of general human capital, and uses it to explain the increasing wage inequality among top managers within firms. Graham et al. (2010) also construct their measure by classifying executive compensation into firm-specific and general compensation. They argue that hiring CEOs with large fixed compensation schemes improves firm performance.

My goal is to determine whether the relative importance of general human capital has exceeded that of firm-specific human capital in firm financial performance and decisions on enhancing activities over recent years. To this end, I consider eight proxies for general CEO human capital. Human capital is generally perceived as a distinctive approach to managing people. Thus, different CEOs have various types of human capital. Each CEO has tailored his/her human capital development through education. Among the many possible attributes related to general human capital, education has been the main focus of human capital research since the studies of Becker (1962) and Mincer (1974). Education is a good starting point for constructing a consistent measure.

Jalbert et al. (2011) claim that CEOs' Ivy League degrees and MBA degrees do not significantly affect firm performance and total compensation. Gottesman and Morey (2010) reveal that the firms managed by CEOs with MBA or law degrees perform no better than firms with CEOs who do not have specialized degrees. These studies indicate that a specific degree does not influence compensation and firm performance. Thus, the highest degree and the number of degrees earned by CEOs are important proxies for education in relation to general human capital. Some CEOs with degrees from more than one educational field are classified under multiple categories.

To include general human capital in relation to experience, I create five proxies for the generality of general CEO human capital. In creating these proxies, I use the CEOs' years of work experience⁶ (including that from current position and from previous to current position) and career paths (Neal 1995; Malmendier and Tate 2005) as bases. CEOs with various experiences have pursued different career paths (e.g., treasurer, sales position, and marketer) to increase their accumulated general human capital throughout their careers. A CEO who has worked for multiple firms is likely to have more general human capital throughout his career. A CEO who has worked in different industries would have been exposed to different business environments. Thus, I consider the number of years at which a CEO has held this position, the number of years during which the CEO has worked as a BOD member⁷, the number of career paths pursued by the CEO in past work experience, the number of firms where the CEO has worked, and the general work experience dummy for general human capital.

Milbourn (2003), Rajgopal et al. (2006), and Francis et al. (2008) empirically proxy for CEO reputation as general human capital because CEO reputations reflect CEOs' social skills, relationships, and behaviors. Milbourn et al. (2003) find that the compensation received by reputed CEOs shows better pay-for-performance sensitivity. Rajgopal et al. (2006) find that the compensations of CEOs with strong reputations are subject to low relative performance evaluation. Similarly, Francis et al. (2008) find that counter-intuitively, more highly reputed CEOs are associated with poorer quality earnings. Because CEOs are likely to develop their reputations over several years, an important task is to determine the measures of a CEO's

⁶ A CEO's experience as a top manager should be a proxy for CEO ability (Rajgopal et al. 2006). Supervisory or managerial experience is also assessed in terms of number of years. Years of experience and years of management experience are squared and added to the equations to examine non-linear effects.

⁷ The board of directors chooses a new CEO who has experience in the business of the firm and makes primary business decisions in the board (Harris and Helfat 1997).

reputation for a specific year on the basis of data on several years. In line with this requirement, I use years from $t-3$ to t to reflect the reputation of a CEO for t . Given the mixed results in previous literature, I classify each article as favorable, neutral, or unfavorable with respect to the comments made about a CEO.

Rosen (1982) and Kremer (1993) reveal that human capital is positively correlated with firm size. Rosen (1982) considers a hierarchical organizational structure, in which labor productivity improves at any given level. The reciprocity between economies of scale and the loss of control associated with large organizations determines organizational size. Other scholars argue that CEOs exploit size to acquire high compensation (Bebchuk and Fried 2003; Baker and Hall 2004). Consistent with previously published theories and empirical works (Rosen 1982; Smith and Watts 1992), I control firm size, expecting large firms to have greater growth opportunities and more complex operations as the demand for managers with high human capital and high equilibrium wages increases.

Previous research examines gender differences in relation to human capital. Nevertheless, empirical evidence on this issue is also mixed. Higgs (2003) holds that by itself, gender diversity increases firm value. A counter argument shows that the percentage of women directors on a board does not affect firm value (Farrell and Hersch 2005), or negatively affects firm value (Adams and Ferreira 2009); women directors are also more risk averse than men directors (Zingales et al. 2010). The inconsistencies in empirical results on gender in relation to human capital may be, at least partially, attributed to the focus on different types of human capital. Gender diversity with respect to human capital may depend on type of knowledge and skills. Therefore, gender is treated as a control variable in this study.

Chapter 4: Empirical Results

4.1 Introduction

This study provides empirical results for the hypotheses on how CEO human capital influences firm decisions and growth. Human capital theory and upper echelon theory have been applied to research on CEOs; these theories suggest that CEO human capital affects firm decisions when it is applied to the efficient operation of a firm (Hambrick and Mason 1984; Murphy and Zbojnik 2008; Frydman 2010). Finally, both general human capital and firm-specific human capital are hypothesized to influence firms. The influence of the attributes of CEO human capital is validated by hand-collected data. This chapter discusses the results of the primary and additional data analyses.

4.2 Main Results

Consistent with previous empirical research, I control for many firm characteristics because these attributes usually affect CEO human capital and compensation schemes. The results of this study are robust to the inclusion of firm fixed effects, which control for any time-invariant unobserved firm heterogeneity. Fixed-effects methods solve “joint determination” problems, in which an unobserved time-invariant variable simultaneously determines human capital variables and CEO compensation. I also address the endogeneity of CEO selection, which is a concern that is likely assigned as a firm’s responsibility as it places a premium on managerial human capital. For example, CEOs with strong human

capital may be able to choose firms that pay more and decide on good strategic policy decisions.

Table 2 shows that the qualifications of CEOs have evolved over time. Arguably, the evolution shows movement from firm-specific human capital to general human capital. It also illustrates that the variables that represent general human capital increase, whereas those that denote firm-specific human capital stay relatively constant over the experimental period. Given recent trends (Frydman 2007, 2010), general human capital is becoming a more important factor than specific human capital in the CEO labor market.

4.2.1 CEO Human Capital and Compensation Schemes

Table 5 presents the empirical results for H1a and H1b. I run panel regressions on the firm fixed effects, in which the dependent variables are the logarithms of CEO salary compensation (columns (1)–(3)) and bonus compensation (columns (4)–(6)). Jensen and Murphy (1990) use the log change in market value as an independent variable. However, market value is highly correlated with firm size. To avoid size effects, Kaplan (1994) uses stock returns as a performance measure. I use stock return and ROA for the performance measure. I also use logarithmic returns instead of arithmetic returns because the latter are too asymmetrically distributed. The explanatory variables of interest in this study are human capital variables. The regressions include industry (two-digit SIC) and year dummies. All reported t-statistics are adjusted for heteroskedasticity and within-firm correlation using firm-level clustered standard errors.

[Insert Table 5 around here.]

Columns (1) and (2) of Table 5 present the coefficients of the regression of salary compensation on firm characteristics. The columns differ by classification of human capital variables. The results show that salary compensation is negatively associated with past firm performance, as measured by ROA. Salary compensation exhibits a strong positive relationship with growth opportunities (Tobin's Q)⁸ after two different types of human capital are included. In column (1), the coefficient of ROA is 0.202 (t-statistics = 1.56), which is non-significant. The coefficient of the previous ROA is -0.194 (t-statistics = -2.17), which is significant. Column (3), however, shows that the coefficients of the previous and current periods' ROAs are -0.329 (t-statistics = -2.88) and 0.191 (t-statistics = 1.73), respectively. These values are significant and non-significant, respectively. These results support the idea that the pay-for-performance sensitivity of ROA diminishes in the base regression when the human capital variables are included. Thus, strong evidence of a statistically positive relationship between fixed pay and past performance exists. The empirical results indicate that the coefficients of the general human capital variables (such as reputation, years of experience, career path, number of firms, general career dummy, BOD experience, educational level, educational fields, and age at which the CEO first held this position) for salary compensation are all positive and significant. By contrast, the coefficients of the firm-specific human capital variables (such as founder and tenure) are negative and nonsignificant. These results are consistent with the assumption that CEOs who exhibit strong general human capital receive a fixed pay premium.

⁸ Tobin's Q (calculated as total assets (data item 6) plus market value (data item 199 × data item 25) minus common equity (data item 60) – deferred taxes (data item 74) divided by total assets (data item 6))

Columns (4) and (5) in Table 5 also present the coefficients of the regression of bonus compensation on firm characteristics, including different human capital variables. This model shows that bonus compensation exhibits a negative and significant relationship with R&D expenditure. Column (4) shows that the coefficient of ROA is 0.096 (t-statistics = 1.66), which is significant. The coefficient of the previous period's ROA is 0.387 (t-statistics = 2.36), which is highly significant. The coefficients of the regression of bonus compensation on all types of human capital, including firm characteristics, are provided in column (6). This column shows that the coefficient of ROA is 0.182 (t-statistics = 1.86, non-significant). The coefficient of previous ROA is 0.273 (t-statistics = 2.97, significant). These results support the idea that the pay-for-performance sensitivity of ROA is positively related to compensation and statistically significant. In addition, the pay-for-performance sensitivity of ROA and the previous period's ROA are both positive and significant when human capital variables are included. Strong evidence of a positive and statistically significant relationship between bonus compensation and performance is found. The empirical results show that the coefficients of the firm-specific human capital variables (such as founder and internal hires) for bonus compensation are positive and significant. By contrast, the coefficients of the general human capital variables (such as reputation, years of experience, number of firms, general work experience dummy, BOD experience, educational level, and age) are non-significant. These results are consistent with the assumption that CEOs with strong firm-specific human capital acquire a bonus premium.

Using the specifications in columns (3) and (6), and consistent with H1a, I find that the coefficients of the general human capital variables are more likely associated with salary than bonus compensation. Consistent with H1b, I show that the coefficients of the firm-specific human capital variables are more likely related to bonus than salary compensation. Finally, I

find that firm size is positively associated with salaries and bonuses. These results support the importance of separating the components of cash compensation. When cash compensation or total compensation is considered instead of separated salary and bonus compensation, significant results for the role of human capital cannot be found. These findings support H1a and H1b. Taken together, the findings are consistent with the human capital theory-based explanation of the better qualification of CEOs with different types of general human capital. These results further suggest that pay premiums reflect executives' superior managerial skills.

4.2.2 Outsider Human Capital and Compensation Schemes

Many economic models of managerial behavior, including most principal-agent models, posit the assumption that managers are risk averse. Economic reasoning (Nicholson 1978) implies that a risk-averse individual prefers less risk when he/she changes employment positions. Therefore, a risk-averse externally hired CEO requires greater fixed compensation than does a risk-averse internally promoted CEO because the former does not bear risks due to lack of firm-specific skills. More specifically, an externally hired CEO requires a pay premium to prompt him/her to switch firms (Murphy and Zabochnik 2008). Table 6 shows the panel estimation of the compensation components on firm characteristics and newly hired CEOs for H2a and H2b. Column (1) of the table presents the coefficients of the regression model based on $\ln(\text{Salary})$. In this regression model, the coefficients of external hires is 0.489 (t-statistics = 2.11) and that of industry changes is -0.193 (t-statistics = -2.53). These results support the idea that a new externally hired CEO is more likely to receive greater

salary compensation (48%) than a new internally promoted CEO when these CEOs are compared with peer industry groups.

Column (2) presents the coefficients of the regression model based on $\ln(\text{Bonus})$. In this model, the coefficient of external hires is 0.302 (t-statistics = 1.47) and that of industry changes is -0.129 (t-statistics = 1.19), consistent with H2a and H2b. I find that the coefficients of the external hire and industry changes dummies show a statistically significant relationship with salary compensation, but not with bonus compensation as I expected. For externally hired CEOs, some evidence indicates fixed pay premium when these CEOs are from the same industry where the hiring firm operates.

[Insert Table 6 around here.]

I assess the sensitivity of the results to the appointment of externally hired CEOs. I separate the externally hired and internally promoted CEOs into two groups (Table 6). The results for the externally hired CEOs are presented in columns (6) and (7). The relative significance of the coefficients of the human capital variables in columns (6) and (7) are more pronounced in columns (4) and (5). These results explain the demand for the strong general human capital that a CEO carries from one firm to another. The effect is more pronounced when a new CEO is externally hired because the firm is accessing the CEO labor market (Murphy and Zabojnik 2004, 2007).

4.2.3 CEO Human Capital and Firm Growth

In Table 9, columns (1) and (2) provide the results for the regression models to which the CEO human capital variables are added. The mean coefficients of the general human capital variables (such as reputation, years of experience, career path, number of firms, general work experience dummy, educational level, educational fields, and age at which the CEO first assumed this position) and the firm-specific human capital variables (such as founder and internal hires) are positive and significant. The results in column (3) support the assertion that CEO human capital plays an important role in adjusting R&D spending to appropriate levels for innovation performance. These results are consistent with H3a and H3b. Columns (4), (5), and (6) indicate that the general human capital variables, except number of firms, are positively and significantly related to firm growth. Conversely, the firm-specific human capital variables (such as tenure, founder, gender, and internal hires) are non-significant. These results support H4a but not H4b. Table 9 shows that firms' innovation performance depends on general CEO human capital, indicating that the average general human capital has risen and that it is positively and significantly associated with firm growth.⁹

[Insert Table 9 around here.]

⁹ In additional verification, I perform unreported analyses with Tobin's Q as a growth opportunity. The results remain the same.

4.2.4 General CEO Human Capital and Selling, General, and Administrative Costs

Table 10 presents evidence of the SG&A cost asymmetry for CEO human capital. The estimated value of $\text{Log}(\text{Sale}_{it}/\text{Sale}_{it-1})$ in column (3) is 0.712 ($t = 17.49$). This value is highly significant, indicating that SG&A costs increase by about 0.71% per 1% increase in sales. The coefficients of the general human capital variables in the same column are negatively significant, and those of years of experience, career path, and general work experience dummy are significant. These results suggest that firms where CEOs have more years of experience, various career paths, and general work experience in various industries suffer from less SG&A cost asymmetry. The coefficients of educational level and educational fields are significant, indicating that firms where CEO have more degrees and have studied many disciplines experience less SG&A cost asymmetry. The regression model results in column (2) illustrate that firms with a founding or family CEO also have less SG&A cost asymmetry. Column (3) suggests that the effects of firm-specific human capital disappear when all types of human capital are considered. In summary, Table 10 provides evidence that firms with strong general CEO human capital have low SG&A cost asymmetry. The differences in firm characteristics are minor even though they are statistically significant.

[Insert Table 10 around here.]

The effects of general human capital differ because SG&A costs translate to more slack resources in mature firms than in developing firms. Table 11 illustrates that cost stickiness is more pronounced in mature firms than in developing firms. This result indicates that on the basis of upper echelon theory, we can conclude that CEO human capital

influences cost stickiness to a greater extent in mature firms than in developing firms. I find significant effects for the subsample of developing firms: that is, years of experience (-0.138 , $t = -2.31$), career path (-0.127 , $t = -2.41$), general work experience dummy (-0.202 , $t = -1.89$), educational field (-0.032 , $t = -1.94$), and age at which the CEO first assumed the position (-0.163 , $t = -2.12$) exhibit a significantly negative coefficient. These results suggest that in developing firms, general human capital is adjusted and appropriately influences SG&A cost stickiness. In the subsample of mature firms, however, five of the 12 variables have significant coefficients, specifically, years of experience (-0.054 , $t = 1.83$), career path (-0.082 , $t = -1.99$), educational level (-0.095 , $t = -1.95$), tenure (-0.006 , $t = -2.27$), and founder (-0.023 , $t = -1.88$). This result indicates that in mature firms, firm-specific human capital influences SG&A expenses. CEOs with strong general human capital influence SG&A expenses in developing firms, indicating that SG&A cost stickiness is driven by low general human capital to a larger extent in mature firms than in developing firms. This finding is consistent with H5.

[Insert Table 11 here.]

Table 12 lists the results for the three performance measures (i.e., ROA, stock return,¹⁰ and Tobin's Q), with alternative explanations. The coefficients of all the general human capital variables are positive and significant, except for number of firms, BOD experience, and general work experience dummy, suggesting that general CEO human capital affects firm

¹⁰ Stock return is measured as $[(SP_{(t)} - SP_{(t-1)}) + DPS_{(t)}] / SP_{(t-1)}$, where $SP_{(t)}$ is the year-end share closing price for year t , $SP_{(t-1)}$ denotes the year-end share closing price for year $t-1$, and $DPS_{(t)}$ represents the annual dividends paid per share in year t (Jensen and Murphy 1990; Kaplan 1994; Francis et al. 2008).

performance. The results are generally consistent with an efficient market-based explanation of the firm earnings achieved by CEOs with general managerial skills. In terms of human capital theory and upper echelon theory, the overall results support the associations among human capital measures, value-enhancing activities, firm growth, and pay premiums. Thus, I demonstrate the performance–human capital function of CEOs because R&D expenses and SG&A costs with value-enhancing activities influence firm performance and growth.

[Insert Table 12 around here.]

4.3 Additional Analysis

I conduct additional tests to further corroborate the results and provide alternative explanations. Typically, these alternative explanations reflect the concern that CEO human capital is directly or indirectly affected by firm characteristics. The first issue I address is sample selection bias due to endogeneity in CEO hiring. Some firms may prefer certain CEO characteristics, which would lead to the endogenous matching of candidates and firms (Graham et al. 2010). For example, large firms are more likely to hire CEOs with strong human capital because they are viewed as capable of running firms at a high level. I estimate a first-stage probit regression of the likelihood that a firm appoints a CEO with strong human capital (i.e., one with human capital above the median). This issue is also a concern in previous work on CEO characteristics, such as those of Bertrand and Schoar (2003) and Malmendier and Tate (2005). I find no evidence of a relationship between the qualities of hired CEOs and other factors. Thus, this type of selection as a primary hiring factor is unsupported by my research.

Structural power, or CEO power,¹¹ is defined as the ability to influence firms' BODs. This type of power emerges from multiple sources, such as position and charisma (Finkelstein 1992). Tosi et al. (2004) empirically proxy for psychologically perceived CEO charisma. Although weak governance can be argued as inherently contributory to CEO power, structural CEO power and governance strength are better treated as distinct constructs (Finkelstein and Hambrick 1988). Another structural power measure, CEO=Chair, is a variable that measures the concentration of positions in the hands of a CEO. If the CEO is not the chairman, he/she has less influence over firm decisions because the chairman is sometimes involved in strategic decision making.¹²

The discussion above indicates a need for high, incentive-based compensation that coincides with considerable benefits from resolving agency problems through monitoring. Nevertheless, benefits from high incentive pay may not be equal across firms. The concern is that even if the current environment warrants an increase in CEO compensation, particularly of the incentive pay form, CEOs who hold power will be opportunistic. Bebchuk and Fried (2004) argue, for instance, that CEOs have considerable influence over their boards and use it to secure excessive compensation. Two theories directly explain the relationship between CEO power and compensation in a cross-section of firms.

To further assess the robustness of the results, I empirically model CEO power as the dependent variable explained by the human capital variables as the independent variables. Table 7 shows that CEO power and CEO=Chair are positively associated with reputation, educational level, family firm dummy, and ROA-measured performance. However, the table

¹¹ Given the scope of a CEO's power, several researchers (e.g., Bertrand and Mullainathan 2003; Bebchuk and Fried 2004) suggest that CEOs effectively set their own compensation. Bebchuk et al. (2002) argue that executive compensation can be explained by a managerial power approach. This view holds that powerful CEOs influence boards of directors into paying them high compensation (Bebchuk et al. 2002). A substantial body of evidence indicates that pay is higher and less sensitive to performance when executives have more power.

¹² The chairman is often the ex-CEO, indicating that the ex-CEO is still involved in decision making.

also shows that CEO power is negatively associated with age and size. Overall, the empirical evidence suggests that when CEO power increases, the association among reputation, career path, educational fields, tenure, founder dummy, and internal hire dummy strengthens, whereas that between the age at which the CEO first held the position and size diminishes.

[Insert Table 7 around here.]

I repeat the analysis above, but this time incorporates a CEO power variable into the regression model. Table 8 presents the estimates of the same regressions as those in Table 5, but the former includes CEO power and CEO=Chair as main explanatory variables. Even after controlling for CEO power and CEO=Chair, the coefficients of the general human capital variables (reputation, years of experience, career path, number of firms, general work experience dummy, BOD experience, and educational fields) for salary compensation are positive and significant. The coefficients of the firm-specific human capital variables (such as tenure and founder) for bonus compensation are also positive and significant. These results reinforce the previously discussed findings: CEOs' general human capital is more likely related to CEO fixed compensation than to CEO bonus compensation, and CEOs' firm-specific human capital is more strongly associated with CEO bonus compensation than with CEO fixed compensation. Overall, Tables 7 and 8 support the robustness of the results.

[Insert Table 8 around here.]

Previous literature shows that R&D and advertising expenses represent value-enhancing investments, and therefore positively affect future firm performance (Lev and Sougiannis 1996). I replicate the analyses, this time excluding R&D and advertising from total SG&A costs, an approach that does not change the results. Similar to other researchers, I use the book-to-market ratio as an alternative measure of unreported firm growth opportunities. Lower ratios mean greater growth opportunities because the market's valuation of a firm and future cash flow do not capture factors in the book value of company assets. This alternative measure of growth opportunities also does not change my results, indicating robustness to the use of alternative measures. This measure is also consistent with the evidence when I use the variables of value-enhancing investments.

Chapter 5: Conclusion and Limitations

5.1 Conclusion and Implications

In this dissertation, I focus on the value of CEO human capital in firms, an issue that has not been comprehensively investigated in previous research. Previous studies have presented mixed results on CEO compensation and firm performance, and have disregarded the contributions of human capital. Most previous studies on CEO compensation also focus on total CEO compensation contingent on performance, and do not explicitly examine CEO human capital. These issues give rise to intriguing concerns, such as whether CEO compensation schemes are adequate tools for increasing CEO human capital in a firm, as well as how CEO human capital affects firms and what human capital measures are used to determine such effects. I carry out factor analysis to formalize and derive testable hypotheses, using the multidimensional human capital of CEOs (Dutta 2008). I focus on whether CEO human capital is multidimensional (Harris and Helfat 1997; Dutta 2008). For example, human capital is categorized into two types: general human capital (applicable across all firms) and firm-specific human capital (applicable only to a particular firm).

Salary compensation (i.e., fixed pay) is positively associated with general CEO human capital, and bonus compensation (i.e., contingent incentive pay) is positively associated with firm-specific CEO human capital. These findings are empirical evidence that the two types of human capital play mutually exclusive roles in determining fixed and incentive compensation. Such roles may explain why previous researchers who did not separate compensation schemes do not detect a significant role for human capital. Additionally, the

current study provides evidence that the career concerns of CEOs are relevant, particularly to explaining CEO successions.

I also investigate whether the two types of CEO human capital differentially drive value-enhancing activities (e.g., R&D and SG&A initiatives) for firm growth. On the basis of upper echelon theory and human capital theory, this study predicts that human capital and strategic decisions on value-enhancing activities have a significant relationship. The results are consistent with these predictions. In addition, they support general CEO human capital as an important explanation for external CEO successions and suggest the importance of CEO human capital in understanding how CEOs with strong human capital have run their firms in recent decades. I emphasize that the interpretation of these results does not depend on the existence of an agency problem. Even though CEOs are efficient, firm decisions can either be poor or effective because CEOs possess different types of human capital.

This dissertation offers an alternative view of what determines the level of CEO compensation schemes and what factors are important to a CEO's operation of a firm. The findings have implications for the literature on managerial discretion (Hambrick and Finkelstein 1987). Measurable strong CEO human capital lead to high levels of CEO compensation, and the results indicate that more able CEOs receive better rewards because they contribute to firm performance by formulating and implementing efficient value-enhancing activities.

Finally, the findings suggest that the increase in general human capital over the studied period is explained by an increase in the relative importance of such capital, in contrast to firm-specific human capital, in managing contemporary firms. This study provides direct evidence of the growing importance of general managerial human capital versus firm-specific

human capital. The evidence suggests that boards choose external CEO candidates with strong general human capital. This preference possibly stems from the previous lifetime experiences of CEOs being considered indicative of general CEO human capital.

This study contributes to research regarding CEO human capital by elucidating the compensation schemes and strategic decisions on the investment policies of firms. First, I emphasize the importance of considering human capital, which may not have been discussed in human capital literature. Second, I reveal the need to ascertain the relationship between the value of CEO human capital and different compensation components. This study offers a number of interesting implications for understanding human capital in relation to CEOs and firms; such understanding should not be restricted to academics, but extended to board members and shareholders. Future research can examine how CEO human capital influences the strategic interaction between governments and firms with conceptual performance measures.

5.2 Limitations

The results of this study should be interpreted with consideration of its limitations. The use of empirical data gives rise to certain inherent weaknesses. Human capital pertains to the accumulation of the efforts, skills, and capabilities that people contribute to an organization. The scope of the study is limited to collectible data associated with CEO human capital. The findings should therefore be interpreted only in this context and should not be generalized to other types of CEO human capital. For example, CEO charisma and social skills are related to CEO human capital but may involve factors that do not emerge as important in the present study.

The selection of S&P 500 firms from among US firms should also enable generalization of the findings to this population. The fact that S&P 500 firms may not adequately represent all US firms should be recognized, although no specific bias is found and the S&P 500 firms account for 67% of the assets of total domestic firms. Because the objective of this paper is limited to validating the developed hypotheses, I leave the aforementioned issues to future research.

Table 1
Sample and Descriptive Statistics for CEO Compensation, Human Capital, and Firm Characteristics

Sample selection criteria

Total	
Initial firm-year observations for years 2000–2009	4,500
1. Less missing CEOs' biographical data	127
2. Less data for firms with CEO change	256
3. Less data form COMPUSTAT	753
Final sample	3,364

The sample consists of 3,364 CEOs in S&P 500 firms (2001- 2009 data). The compensation data were obtained from the Compustat and proxy statements. All variables are defined as in appendix. This table reports descriptive Statistics. Compensation amounts and sales are expressed in 2001 dollars. All other variables are defined as in appendix.

Panel A: Descriptive statics for CEO compensation

Total compensation is the sum of salary, annual bonus, and our valuations for stock options, performance plans, phantom stock, and restricted stock. (\$ 1,000)

Variable	N	Mean	Std Dev.	Lower Quartile	Median	Upper Quartile
Total Pay	3364	10,026	15,279	1962	5655	11115
Salary Pay	3364	871.061	396.849	620.000	875	1069
Bonus Pay	3364	939	2752	0.000	262	1148
ln(Total pay)	3364	8.516	1.442	7.80	8.58	9.32
ln(Bonus)	3364	6.799	1.166	6.215	6.908	7.539
ln(Salary)	3364	6.586	1.201	6.400	6.778	7.000

Panel B: Human Capital

Variables	N	Mean	Std Dev.	25 th Pctl	Median	75 th Pctl
Experience Years	3364	7.796	8.397	4	7	11
Career Path	3364	4.650	3.158	2	5	10
Number Firms	3364	2.155	1.762	2	2	6
General Work Experience dummy	3364	0.347	0.476	0	0	1
BOD experience	3364	5.850	0.984	2	6	10
Education level	3364	1.603	0.527	1	2	2
Education Areas	3364	1.734	0.260	1	2	2
CEO Age	3364	55.503	6.901	51	56	60
The First CEO age	3364	46.782	5.513	41	46	54
Reputation	3364	15.112	8.315	11	16	19
Tenure	3364	6.881	7.082	2	5	9
CEO from Family-Firm	3364	0.152	0.359	0	0	0

Table 1 (continued)*Panel C: Reputation as a General Human Capital*

	Tone	N	Mean	Std Dev.	25 th Pctl	Median	75 th Pctl
US	+	3364	2.216	9.332	0	0	1
	0	3364	4.230	11.528	0	1	3
	-	3364	2.216	9.332	0	0	1
International	+	3364	2.811	9.403	0	0	1
	0	3364	2.642	9.494	0	0	1
	-	3364	1.599	7.473	0	0	0
Wire	+	3364	0.407	1.601	0	0	0
	0	3364	0.297	1.521	0	0	0
	-	3364	0.211	1.191	0	0	0

Panel D: CEO Characteristics

	N	Mean	Std Dev.	25 th Pctl	Median	75 th Pctl
External Hires (%)	3364	0.281	0.297	0.200	0.250	0.352
Industry Change (%)	3364	0.173	0.356	0.125	0.165	0.258
CEO Power	3364	0.355	0.462	0.231	0	0

Panel E: Firm Characteristics

	N	Mean	Std Dev.	25 th Pctl	Median	75 th Pctl
ROA	3364	0.100	0.083	0.052	0.092	0.144
Stock Return	3364	0.019	0.436	-0.231	0.015	0.220
ROE	3364	0.172	0.830	0.103	0.171	0.253
Tobin's Q	3364	2.055	1.277	1.226	1.646	2.417
Firm size (\$ 1mil)	3364	22,046	41,584	4,846	9,323	19,092
Leverage	3364	0.0593	0.217	-0.071	2.406	1.637
CAPEX	3364	0.0476	0.050	0.017	0.0353	0.061
R&D/Asset	3364	0.045	0.059	0.004	0.025	0.068
Growth	3364	0.121	0.213	0.035	0.096	0.175
Sales (\$ 1mil)	3364	15,769	31,535	2,915	6,824	14,751
Diversification	3364	0.526	0.438	0	1	1
SG&A (\$ 1mil)	3364	3,284	1,689	1,824	3,052	3,985

Table 2
CEO Human Capital over the Period

Panel A: General Human Capital

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Experience Years (years)	7.121	7.665	8.021	8.069	7.736	7.811	7.727	7.906	8.014
Career Path	3.723	3.937	4.458	5.017	5.067	5.468	6.241	5.932	5.996
Number Firms	1.827	1.954	2.042	2.286	2.383	2.364	2.404	2.395	2.305
BOD Experience	4.523	5.252	5.450	5.600	6.158	5.927	6.180	6.524	6.425
Education Areas	1.342	1.467	1.571	1.724	1.786	1.789	1.853	1.849	1.942
Education Level (0-2)	1.324	1.524	1.592	1.627	1.584	1.608	1.657	1.638	1.643
CEO Age	55.121	55.420	55.675	55.996	55.652	55.698	55.828	56.044	56.076
The First CEO Age	47.535	46.382	46.517	46.244	46.346	46.033	46.009	46.029	46.021
Reputation	11.638	12.455	14.285	14.232	16.546	16.346	19.111	19.757	20.052

Panel B: Firm-specific Human Capital

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Tenure (years)	6.538	6.867	7.085	7.090	6.776	6.795	6.622	6.883	6.925
Family-Firms CEO	15.8%	14.3%	13.829%	12.698%	11.178%	11.858%	10.563%	10.057%	10.035%

Panel C: CEO characteristics

	2001	2002	2003	2004	2005	2006	2007	2008	2009
External Hires (%)	15.1%	15.7%	18.149%	22.857%	24.169%	25.067%	25.117%	23.287%	27.052%
Industry Change (%)	10.9%	11.1%	12.455%	14.603%	15.454%	16.172%	16.666%	15.068%	16.854%
CEO power	0.195	0.215	0.258	0.275	0.318	0.341	0.354	0.389	0.392
Gender	1.529%	1.752%	1.065%	0.943%	1.212%	1.340%	2.578%	2.725%	2.750%

Table 3
Human Capital by Industry

Industry	Salary (1,000\$)	Bonus (1,000\$)	Age	The First CEO age	Reputation	Education Level (0~2)	Education Areas	BOD Experience (years)	Work Experience (years)	Career Path	Number of Firms	CEOs' Power	Tenure (years)	Family firms' CEO (%)	External Hires (%)	Industry Change (%)
Energy	959.789	2387.63	57.375	50.85	8.730	1.515	1.12	6.32	9.773	2.85	1.54	0.388	8.542	14.027	19.457	7.239
Materials	827.085	581.969	56.282	49.62	6.156	1.534	1.37	4.18	4.894	3.28	1.87	0.316	4.631	3.289	13.157	9.867
Business equipment	894.606	941.775	55.810	48.65	15.133	1.589	1.38	5.95	7.255	4.03	2.53	0.318	6.665	11.818	10.942	8.842
Consumer equipment	972.890	1080.01	55.466	47.52	17.181	1.473	2.06	5.03	8.894	5.61	3.09	0.329	7.240	18.208	24.567	19.942
Wholesale and retail	963.352	783.626	55.318	47.61	26.369	1.462	1.67	6.49	7.409	5.84	1.69	0.314	6.750	17.613	10.795	10.227
Health Care and drugs	937.853	623.233	55.125	45.85	9.469	1.766	1.16	4.83	7.376	3.09	1.72	0.320	6.299	6.802	25.510	21.428
Financials	774.888	1068.44	56.939	44.93	14.202	1.667	1.86	6.85	8.718	4.65	4.52	0.286	7.7	13.939	17.272	9.693
Information Technology	712.162	610.202	53.328	42.57	34.754	1.552	2.35	3.86	8.022	5.24	4.39	0.311	7.157	13.812	38.950	22.375
Telecommunicat ion Services	1105.01	832.309	54.769	48.67	40.461	1.846	1.82	5.26	8.384	5.16	4.86	0.288	6.923	0	46.153	30.769
Utilities	842.751	502.365	58.058	51.96	4.295	1.825	1.45	5.57	6.307	4.37	1.42	0.311	5.360	3.414	29.756	14.146

This table presents the CEO human capital and CEO compensation for the Global Industry Classification Standard (GICS). The sample comprises firm-year observations from S&P 500 firms during 2001–2009. It also presents average for the CEO general human capital, firm-specific human capital and average each compensation for each of the Global Industry Classification Standard (GICS). All variables are winsorized at the 5th and 95th percentile values. Variable definitions and data sources are provided in the Appendix.

Table 4
Hypotheses

This table summarizes the hypotheses and their predicated effect on the explanatory variables.

Human capital Theory, Upper echelon theory		Test 1 (table 5,7,8)	Test 2 (table 6)	Test 3 (table 9)	Test 4 (table 10,11)	Test 5 (table 12)
Firm Decision Making	Compensation Schemes	+				
	Outside Hires	+	+			
CEO Decisions Making →	Growth			+		
Value enhancing Investments Activities	R&D expense			+		
	SG&A cost asymmetry				-	
	Performance					+

Table 5
Test of Human Capital Specificity for Fixed and Incentive pay

Independent Variables	ln(Salary)	ln(Salary)	ln(Salary)	ln(Bonus)	ln(Bonus)	ln(Bonus)	ln(Cash)
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	3.161*** (4.27)	2.627*** (3.16)	2.992*** (5.11)	3.112*** (4.75)	2.828*** (5.99)	4.321*** (4.02)	2.537*** (4.53)
Ln(Reputation)	0.011** (1.99)		0.090* (1.78)	0.014 (1.32)		0.005 (1.21)	0.001 (1.05)
Experience Years	0.028** (2.01)		0.065* (1.72)	0.016 (1.11)		0.007 (0.35)	0.075 (1.31)
Career Path	0.033*** (2.99)		0.025*** (2.37)	0.051 (1.38)		0.022 (1.61)	0.034** (2.02)
Number Firms	0.079* (1.76)		0.050** (2.06)	-0.017 (-1.06)		-0.009 (-1.23)	-0.000 (-0.27)
General Work Experience Dummy	0.155*** (2.98)		0.295*** (2.41)	0.021 (1.35)		0.043 (1.55)	0.116* (1.68)
BOD Experience	0.010** (1.98)		0.111* (1.70)	0.016 (0.39)		0.032 (0.52)	0.067 (0.68)
Education Level	0.029** (1.99)		0.010* (1.85)	-0.002 (-0.46)		-0.014 (-0.58)	-0.009 (-0.59)
Education Areas	0.039*** (2.53)		0.031** (2.01)	0.082 (1.63)		0.012* (1.71)	0.029** (1.99)
CEO Age	0.009 (1.63)		0.005 (1.60)	-0.085 (-1.43)		-0.006 (-1.63)	-0.002** (-1.98)
The First CEO Age	-0.115*** (-2.92)		-0.193** (-2.30)	-0.019 (-1.56)		-0.094* (-1.77)	-0.038** (-2.54)
Tenure		-0.024 (-1.25)	-0.019 (-1.11)		0.047** (1.97)	0.039 (1.57)	0.012** (1.98)
Founder		-0.108 (-0.59)	-0.222 (-1.42)		0.161** (2.17)	0.130** (2.00)	0.156 (1.58)
Internal Hires		0.038 (1.17)	0.093 (1.46)		0.024* (1.87)	0.035* (1.77)	0.048 (1.33)
Gender	-0.001 (-1.22)	0.001* (1.78)	-0.002 (-1.43)	-0.003 (-0.59)	0.004* (1.88)	0.003 (0.29)	0.001 (1.31)
ROA	0.202 (1.56)	0.137 (1.02)	0.191* (1.73)	0.096* (1.66)	0.430 (1.00)	0.182* (1.86)	0.263* (1.71)
ROA ₋₁	-0.194** (-2.17)	-0.229** (-1.97)	-0.329*** (-2.88)	0.387** (2.36)	0.379** (2.22)	0.273*** (2.97)	0.352*** (2.76)
Stock Return	0.106** (2.27)	0.141** (2.01)	0.093* (1.68)	0.093*** (2.68)	0.109*** (4.08)	0.115*** (3.24)	0.106*** (3.16)
Stock Return ₋₁	0.119** (2.37)	0.179*** (4.01)	0.204*** (3.39)	0.264*** (3.26)	0.301*** (4.04)	0.270*** (3.69)	0.194*** (5.03)
Leverage	0.190** (2.18)	0.522*** (3.94)	0.364** (2.24)	0.364 (1.24)	-0.514** (-2.33)	-0.290** (-2.18)	-0.306** (-2.15)
Tobin's Q	0.024* (1.78)	0.117 (1.51)	0.053** (2.33)	0.053*** (4.73)	0.169*** (3.06)	0.074*** (5.78)	0.99*** (4.63)

CAPEX	0.678*** (2.62)	0.845*** (2.77)	0.841*** (2.80)	0.641* (1.80)	1.561* (1.91)	1.158*** (3.62)	0.867*** (2.64)
R&D	-0.519* (-1.99)	-0.970*** (-2.83)	-0.527** (-2.19)	-0.727*** (-3.19)	-0.811*** (-2.35)	-1.119*** (-2.59)	-0.825*** (-2.23)
Growth	-0.261 (-1.11)	-0.305* (-1.67)	-0.188 (-1.55)	0.247 (1.07)	0.206* (1.86)	0.304 (1.61)	0.402 (1.23)
Sales	0.098*** (4.53)	0.103*** (2.84)	0.073** (2.01)	0.242*** (4.55)	0.388*** (5.14)	0.203** (3.85)	0.192** (2.31)
Size	0.115*** (5.68)	0.153*** (4.59)	0.145*** (5.00)	0.205*** (5.13)	0.344*** (4.89)	0.445*** (10.68)	0.423*** (5.36)
Adjusted R ²	50.6%	52.4%	53.3%	53.3%	49.8%	51.8%	54.7%
N	3364	3364	3364	3364	3364	3364	3364

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. Size is defined as logarithm of total assets. All other variables are defined as in appendix. The firm and year fixed effects are not reported in the table. The t-statistics are based on the Huber-White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

TABLE 6
Panel Estimation of Compensation Components on Firms' Characteristics and New Hired CEOs

Independent Variables	ln(Salary)	ln(Bonus)	ln(Total Pay)	ln(Salary)	ln(Bonus)	ln(Salary)	ln(Bonus)
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	5.305*** (9.48)	6.274** (8.99)	5.545*** (7.84)	4.505*** (14.91)	4.850*** (14.50)	5.892*** (17.82)	4.564*** (10.54)
External Hires	0.489** (2.11)	0.302 (1.47)	0.283*** (2.56)				
Industry Change	-0.193** (-2.53)	-0.129 (-1.19)	-0.134* (1.88)			-0.245*** (-3.14)	-0.156** (-1.99)
Ln(Reputation)	0.001** (2.18)	0.000 (0.40)	0.020* (1.74)	0.009 (1.55)	0.004 (0.48)	0.014*** (3.26)	0.008 (1.44)
Experience Years	0.000* (1.89)	-0.015 (-1.04)	0.000** (2.02)	0.871** (1.99)	-0.046 (-0.4)	0.002** (2.22)	-0.023 (-1.37)
Career Path	0.074** (2.55)	0.010* (1.94)	0.009* (1.82)	-1.339** (-2.28)	-0.065 (-0.48)	0.088** (2.23)	0.007 (1.33)
Number Firms	0.001* (1.93)	-0.000 (-1.08)	0.000 (0.64)	0.002 (1.58)	0.015 (1.46)	0.007* (1.84)	0.000 (0.54)
General Work Experience Dummy	0.104*** (2.56)	0.086 (1.57)	0.143** (2.18)	0.009* (1.68)	-0.056* (-1.91)	0.143*** (3.06)	0.067* (1.75)
BOD Experience	0.002* (1.78)	0.000 (0.11)	0.000* (1.69)	0.023** (2.38)	0.333 (0.91)	0.004*** (2.52)	0.000 (0.64)
Education Level	0.000 (0.22)	-0.000 (-1.16)	-0.000 (-1.42)	0.004* (1.64)	-0.055 (-0.91)	-0.000 (-0.76)	-0.000 (-1.28)
Education Areas	0.041* (1.83)	0.022 (1.02)	0.014 (1.39)	-0.017* (-1.85)	0.032* (1.88)	0.054* (1.94)	0.067 (0.93)
CEO Age	-0.023 (-0.77)	0.000 (0.19)	0.021 (0.53)	0.014** (1.99)	0.018 (0.19)	-0.052* (-1.72)	0.009 (1.25)
The First CEO Age	-0.001** (-2.10)	-0.000*** (-2.84)	-0.005* (-1.94)	0.47 (1.35)	1.488 (0.97)	-0.007*** (-2.68)	-0.006** (-2.34)
Tenure	-0.004 (-1.04)	0.019** (1.99)	-0.000 (-0.58)			-0.002 (-0.64)	0.061** (2.26)
Founder	-0.098** (-2.29)	-0.012* (-1.77)	-0.074 (-1.62)	-0.243* (-1.88)	0.014* (1.73)	-0.135*** (-3.97)	-0.054 (-1.44)
Gender	0.000 (0.43)	0.010 (0.68)	0.008 (0.55)	-0.001 (-0.74)	0.001 (0.14)	0.001 (0.67)	0.008 (0.91)
Size	0.112*** (10.98)	0.243*** (9.87)	0.214*** (9.82)	0.223*** (7.71)	0.109*** (9.44)	0.362*** (12.52)	0.391*** (14.62)
Adjusted R ²	50.2%	51.3%	49.4%	42.3%	39.5%	38.2%	39.4%
N	121	121	121	86	86	45	45

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. Size is defined as logarithm of total assets. Columns 4 and 5 consider internally promoted CEO inside the firm. Columns 6 and 7 consider CEOs from outside the firm. All other variables are defined as in appendix. The firm and year fixed effects are not reported in the table. The t-statistics are based on the Huber-White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

Table 7: Test of Human Capital Variables for CEO Power

Independent Variables	CEO power	CEO=Chair
	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	0.499*** (5.14)	0.232*** (4.68)
Ln(Reputation)	0.031** (1.97)	0.028** (2.43)
Experience Years	0.017 (1.62)	0.029** (1.99)
Career Path	0.023*** (2.24)	0.133*** (2.82)
Number Firms	0.011*** (2.68)	-0.052 (-0.67)
General Work Experience Dummy	0.042 (0.98)	0.002 (1.33)
BOD Experience	-0.000 (-0.19)	0.057** (2.13)
Education Level	0.063 (1.63)	-0.037 (-0.61)
Education Areas	0.067** (1.97)	0.54* (1.72)
CEO Age	0.054 (1.15)	0.106 (1.45)
The First CEO Age	-0.086 (-1.62)	-0.092* (-1.92)
Tenure	0.081 (1.03)	0.068** (1.99)
Founder	0.129* (1.76)	0.152*** (4.67)
Internal Hire	0.174 (1.52)	0.126** (2.06)
Gender	-0.028 (-1.52)	-0.004 (-1.55)
Adjusted R ²	61.2 %	59.3%
N	3364	3364

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. Size is defined as logarithm of total assets. All other variables are defined as in appendix. The firm characteristics, the firm and year fixed effects are not reported in the table. The t-statistics are based on the Huber-White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

Table 8: Test of Human Capital Variables for Fixed Pay and Incentive Pay

Independent Variables	ln(Salary)	ln(Bonus)
	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	4.044*** (8.36)	3.289*** (6.84)
Ln(Reputation)	0.042* (1.87)	0.033 (1.01)
Experience Years	0.047* (1.83)	0.151 (1.59)
Career Path	0.037** (1.98)	0.163 (0.53)
Number Firms	0.041* (1.89)	-0.009 (-1.37)
General Work Experience Dummy	0.142** (2.16)	0.133 (1.60)
BOD Experience	0.084* (1.86)	-0.002 (-0.72)
Education Level	-0.014 (-1.47)	-0.003 (-0.91)
Education Areas	0.072** (2.04)	0.060* (1.86)
CEO Age	0.016 (1.52)	-0.009* (-1.74)
The First CEO Age	-0.124** (-2.47)	-0.093* (-1.91)
Tenure	-0.094 (-1.53)	0.046* (1.66)
Founder	-0.183 (-1.52)	0.141*** (2.87)
Internal Hire	0.129 (1.54)	0.095* (1.84)
Gender	-0.006 (-1.06)	0.009 (0.85)
CEO power	0.498*** (6.19)	1.878*** (7.96)
CEO=Chair	0.123*** (2.85)	0.183* (1.83)
Adjusted R ²	57.7 %	51.8%
N	3364	3364

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. Size is defined as logarithm of total assets. All other variables are defined as in appendix. The firm characteristics, the firm and year fixed effects are not reported in the table. The t-statistics are based on the Huber-White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

Table 9: Test of CEO Human Capital for R&D Activities and Firm Growth

Independent Variables	ln(R&D/Sales)	ln(R&D/Sales)	ln(R&D/Sales)	log(Sales _{it} /Sales _{it-1})	log(Sales _{it} /Sales _{it-1})	log(Sales _{it} /Sales _{it-1})
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	3.128*** (7.27)	1.084** (2.36)	2.312*** (6.15)	2.879*** (10.295)	1.767*** (4.333)	2.289*** (11.24)
Ln(Reputation)	0.008* (1.87)		0.004* (1.66)	0.011** (2.00)		0.015* (1.82)
Experience Years	0.010** (2.00)		0.006* (1.72)	0.028* (1.72)		0.033* (1.91)
Career Path	0.202** (2.46)		0.147*** (2.87)	0.254*** (2.63)		0.151*** (2.59)
Number Firms	0.178** (2.14)		0.097** (1.98)	-0.038 (-0.69)		-0.163 (-0.53)
General Work Experience Dummy	0.007* (1.77)		0.011* (1.69)	0.109*** (3.02)		0.107** (2.37)
BOD Experience	-0.002 (-0.57)		-0.022 (-1.16)	0.025** (2.06)		0.033* (1.72)
Education Level	0.211*** (2.63)		0.114** (2.24)	0.019* (1.92)		0.020* (1.72)
Education Areas	0.176** (2.26)		0.114* (1.87)	0.112** (2.26)		0.103*** (2.71)
CEO Age	-0.098 (-1.45)		-0.432 (-1.64)	-0.58 (-1.33)		-0.060 (-1.56)
The First CEO Age	-0.007* (-1.82)		-0.008** (-2.19)	-0.071** (-1.98)		-0.078*** (-2.96)
Tenure		-0.059 (-1.52)	-0.129 (-1.54)		-0.073 (-1.39)	-0.095 (-1.64)
Founder		0.263*** (3.11)	0.151*** (2.67)		0.072 (1.11)	-0.133 (-0.81)
Internal Hire		0.018** (2.28)	0.023** (2.08)		0.222* (1.66)	0.183 (0.83)
Gender	-0.050 (-1.33)	-0.124 (-1.47)	-0.177 (-1.59)	0.004 (1.55)	-0.084 (-0.93)	0.015 (1.20)
ROA	0.182 (0.46)	0.280 (0.06)	0.196 (1.16)	0.527*** (4.42)	0.599*** (5.31)	0.648*** (4.83)
ROA ₋₁	0.332*** (2.64)	0.417*** (3.29)	1.786*** (3.16)	0.121*** (2.94)	0.131*** (3.42)	0.174*** (2.57)
Stock Return	0.105 (1.54)	0.007 (1.34)	0.093* (1.68)	0.281*** (4.85)	0.297** (3.52)	0.243** (2.27)
Stock Return ₋₁	0.190** (2.31)	0.153* (1.79)	0.264** (2.24)	0.161* (1.74)	0.321 (1.54)	0.204 (1.55)
Leverage	-0.074*** (-2.78)	-0.067*** (-4.42)	-0.153*** (-2.93)	0.093** (1.98)	0.058** (2.05)	0.075* (1.73)
Tobin's Q	0.101 (1.62)	0.368* (1.73)	0.241* (1.80)	0.511** (2.11)	0.792** (2.20)	0.608** (1.99)

CAPEX	0.119** (1.99)	0.112*** (2.56)	0.127** (2.19)	0.712* (1.86)	0.574** (2.04)	0.894 (1.54)
Growth	0.212*** (2.88)	0.157** (2.99)	0.201** (2.35)			
Size	0.345*** (8.14)	0.491*** (9.14)	0.311*** (8.13)	0.221 (1.36)	0.082 (0.83)	0.334 (1.41)
Adjusted R ²	58.6%	51.7 %	50.3%	61.3%	52.4%	50.3%
N	985	985	985	3364	3364	3364

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. Size is defined as logarithm of total assets. To be samples, we consider firms reporting R&D expense among S&P 500 firms. All other variables are defined as in appendix. The firm and year fixed effects are not reported in the table. The t-statistics are based on the Huber-White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

Table 10: Test of CEO Human Capital for SG&A Expenses

Independent Variables	Log(SG&A _{it} / Sales _{it} / SG&A _{it-1} / Sales _{it-1})	Log(SG&A _{it} / Sales _{it} / SG&A _{it-1} / Sales _{it-1})	Log(SG&A _{it} / Sales _{it} / SG&A _{it-1} / Sales _{it-1})
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	-0.461*** (-7.27)	-0.444*** (-5.36)	-0.362*** (-5.75)
Log(Sales _{it} / Sales _{it-1})	0.561*** (15.26)	0.612*** (21.53)	0.712*** (17.49)
Ln(Reputation)	0.153 (1.27)		0.183 (0.76)
Experience Years	-0.098* (-1.91)		-0.102* (-1.74)
Career Path	-0.057** (-2.41)		-0.079** (-2.29)
Number Firms	0.082 (1.52)		0.102 (1.18)
General Work Experience Dummy	-0.332* (-1.69)		-0.292* (-1.93)
BOD Experience	0.098 (1.19)		0.123 (1.43)
Education Level	-0.149 (-1.54)		-0.084* (-1.71)
Education Areas	-0.232* (-1.84)		-0.193** (-2.04)
CEO Age	0.097 (0.82)		0.057 (1.26)
The First CEO Age	-0.163** (-2.12)		-0.171** (-1.97)
Tenure		-0.046 (-1.27)	-0.004 (-0.94)
Founder		-0.023* (-1.88)	-0.019 (-1.59)
Internal Hire		0.009 (1.22)	0.014 (1.39)
Gender	0.049 (0.31)	0.072 (1.06)	0.58 (0.92)
ROA	0.082*** (2.56)	0.080** (2.06)	0.096** (2.36)
ROA ₋₁	0.232*** (3.10)	0.271*** (3.74)	0.186** (2.16)
Stock Return	-0.005 (-0.24)	-0.007 (-1.34)	-0.093 (-1.18)
Stock Return ₋₁	-0.012*** (-2.58)	-0.024*** (-3.01)	-0.007** (-2.43)
Leverage	0.190** (2.18)	0.153* (1.79)	0.364 (1.24)

Tobin's Q	-0.074*** (-5.78)	-0.067*** (-4.42)	-0.073*** (-4.33)
CAPEX	0.158* (1.92)	0.268* (1.73)	0.241* (1.80)
R&D	0.119 (1.59)	0.112* (1.86)	0.127** (2.19)
Loss	-0.022 (-0.96)	-0.016 (-0.70)	-0.07 (-1.07)
Size	0.425*** (8.68)	0.558*** (5.14)	0.345*** (8.83)
Adjusted R ²	64.6%	54.7 %	60.3%
N	3364	3364	3364

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. Size is defined as logarithm of total assets. All other variables are defined as in appendix. All human capital variables are interaction terms with $\text{Log}(\text{Sales}_{it} / \text{Sales}_{(it-1)})$. The standard human capital variables, the firm and year fixed effects are not reported in the table. The t-statistics are based on the Huber-White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

Table 11: CEO Human Capital SG&A Cost for Developing versus Mature Firms

Independent Variables	Developing firms (Std. Dev of sales \geq median)	Mature firms (Std. Dev of sales \leq median)
	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	-0.147*** (-3.12)	-0.044** (-2.36)
Ln(Reputation)	0.003 (1.47)	0.000* (1.75)
Experience Years	-0.138** (-2.31)	-0.054* (-1.83)
Career Path	-0.127** (-2.41)	-0.082** (-1.99)
Number Firms	0.082 (1.52)	0.000 (1.35)
General Work Experience Dummy	-0.202* (-1.89)	-0.104 (-1.54)
BOD Experience	0.008 (1.44)	0.105 (1.22)
Education Level	-0.009 (-1.54)	-0.095* (-1.95)
Education Areas	-0.032* (-1.94)	-0.152 (-1.63)
CEO Age	0.097 (1.12)	0.034* (1.72)
The First CEO Age	-0.163** (-2.12)	-0.092 (-1.32)
Tenure	-0.005 (-1.58)	-0.006** (-2.27)
Founder	-0.009 (-1.29)	-0.023* (-1.88)
Internal Hire	0.025 (1.54)	0.019 (1.22)
Gender	0.049 (0.31)	0.072 (1.06)
Adjusted R ²	58.3%	54.7 %
N	1682	1682

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. The sample is portioned into mature firms and growth firms based on the life-cycle stage of each firm year, calculated as the standard deviation of sales over the five years prior to the event year divided by the mean of sales over five years prior to the event year (Banker et al. 2011). Size is defined as logarithm of total assets. All other variables are defined as in appendix. All human capital variables are interaction terms with Log (Sales_{it} / Sales_(it-1)). The standard human capital variables, the economics variables, the firm and year fixed effects are not reported in the table. The t-statistics are based on the Huber-

White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers, 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

Table 12: CEO Human Capital and Firm Performance

Independent Variables	ROA	Stock Return	Tobin's Q
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Intercept	0.941*** (5.06)	0.164*** (10.06)	0.462*** (3.22)
Ln(Reputation)	0.153 (1.27)	0.182** (1.97)	0.183 (0.76)
Experience Years	0.008* (1.91)	0.091* (1.88)	0.052* (1.74)
Career Path	0.057** (2.41)	0.008* (1.82)	0.079** (2.29)
Number Firms	-0.012 (-1.32)	0.003 (1.35)	-0.102 (-1.18)
General Work Experience Dummy	-0.102* (-1.69)	0.005 (1.12)	-0.092* (-1.71)
BOD Experience	0.098 (1.19)	0.068 (1.24)	0.123 (1.43)
Education Level	0.149 (1.54)	-0.009 (-1.24)	-0.084 (-1.61)
Education Areas	0.032* (1.92)	0.002* (1.84)	0.093** (2.04)
CEO Age	0.017 (0.62)	-0.003 (-1.60)	0.097 (1.42)
The First CEO Age	-0.073** (-2.06)	-0.092** (-2.32)	-0.021* (-1.67)
Tenure	-0.159 (-1.24)	-0.086 (-1.57)	-0.104* (-1.94)
Founder	0.724** (2.17)	0.023*** (3.88)	0.319*** (3.59)
Internal Hire	-0.003 (-0.09)	0.009* (1.82)	0.014 (1.13)
Gender	0.049 (1.31)	0.042 (1.26)	0.038 (0.62)
Adjusted R ²	44.6%	44.7 %	42.3%
N	3364	3364	3364

Notes:

The above table is based on a sample of CEOs' human capital can be tracked through our hand-collecting data, COMPUSTAT and CRSP. Size is defined as logarithm of total assets. All other variables are defined as in appendix. The economics variables, the firm and year fixed effects are not reported in the table. All regressions include two-digit SIC code industry dummies. The t-statistics are based on the Huber-White robust standard error, robust to both serial correlation and heteroscedasticity (Rogers, 1993). ***, **, and * denote the significance at 1%, 5%, and 10% confidence level, respectively.

Figure 1

Conceptual Model of Human Capital, Human Capital Effectiveness, Compensation Schemes, and Firm Performances based on Upper Echelon Theory

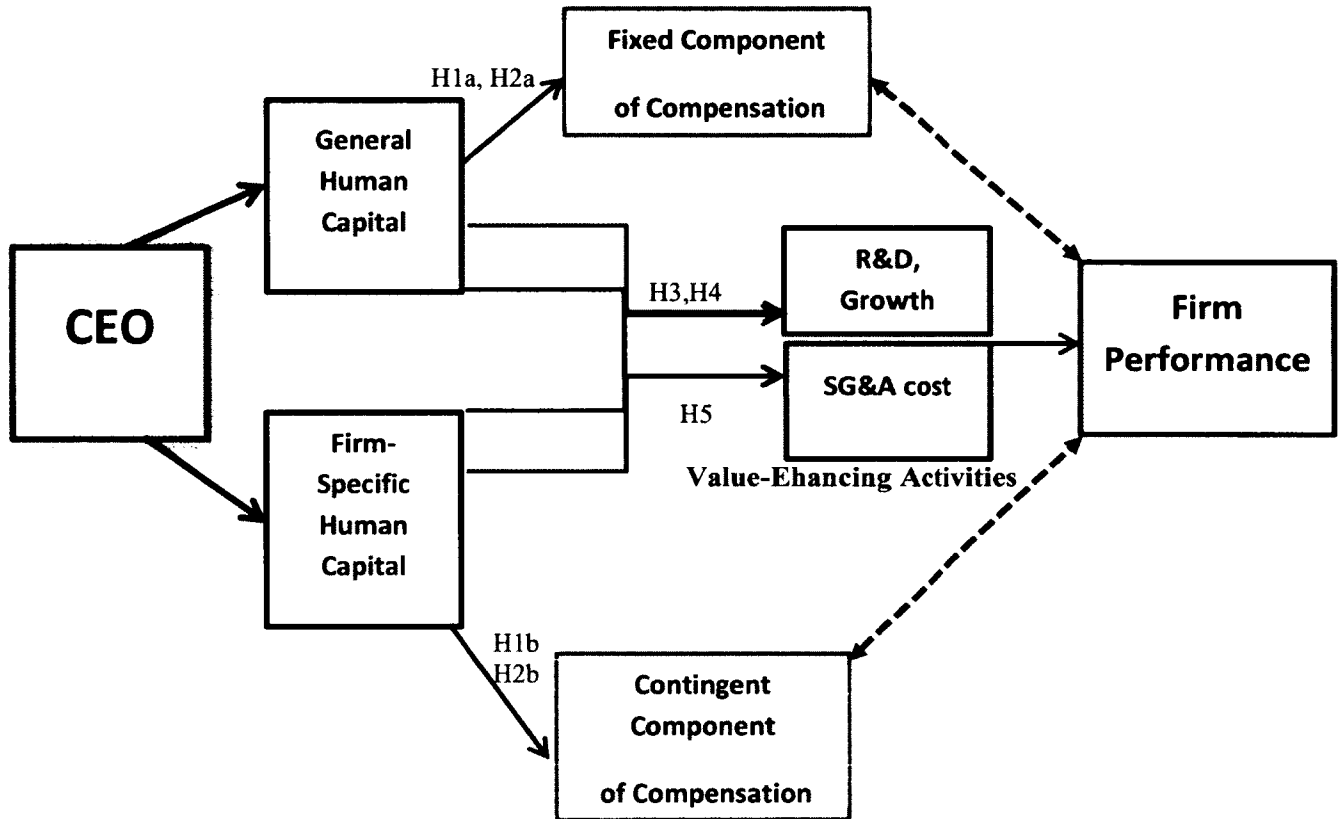


Figure 2

Cross-sectional distribution of changes in externally appointed CEOs from 2001 to 2009. The sample consists of S&P 500 firms for which CEO profile data are available. Variable definitions and data sources are provided in the Appendix.

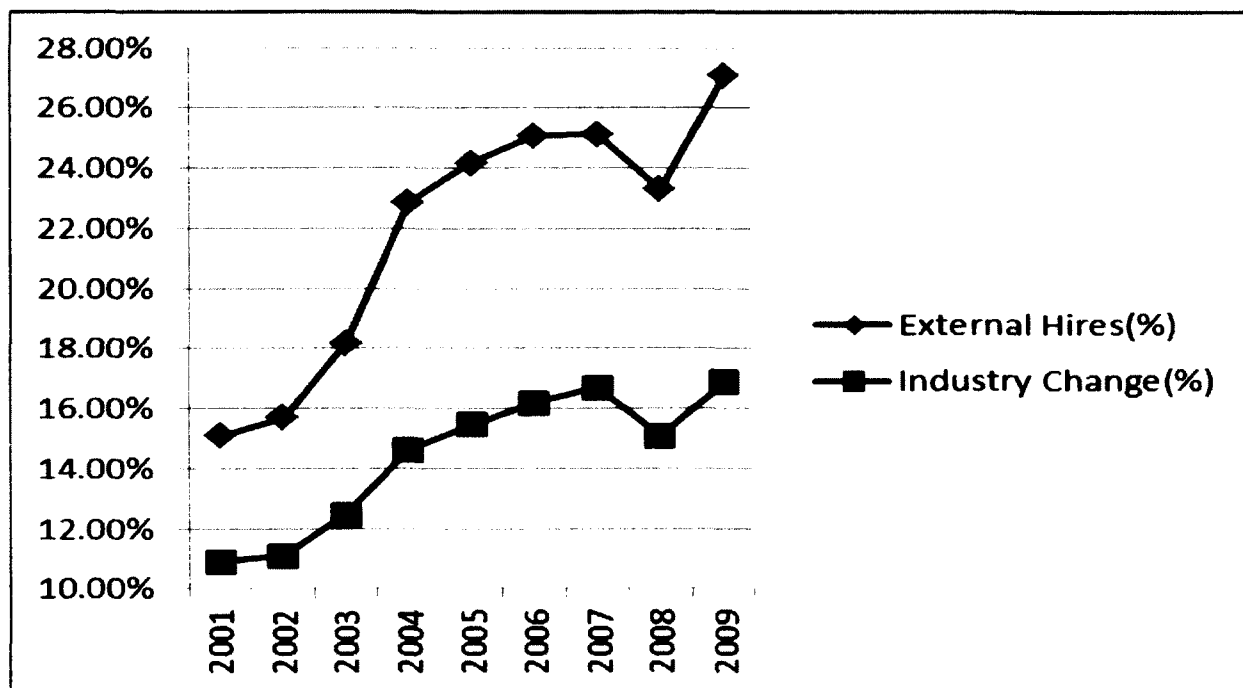


Figure 3

Average years of work experience, BOD experience, and tenure from 2001 to 2009. All variables are winsorized at the 5th and 95th percentiles. Variable definitions and data sources are provided in the Appendix.

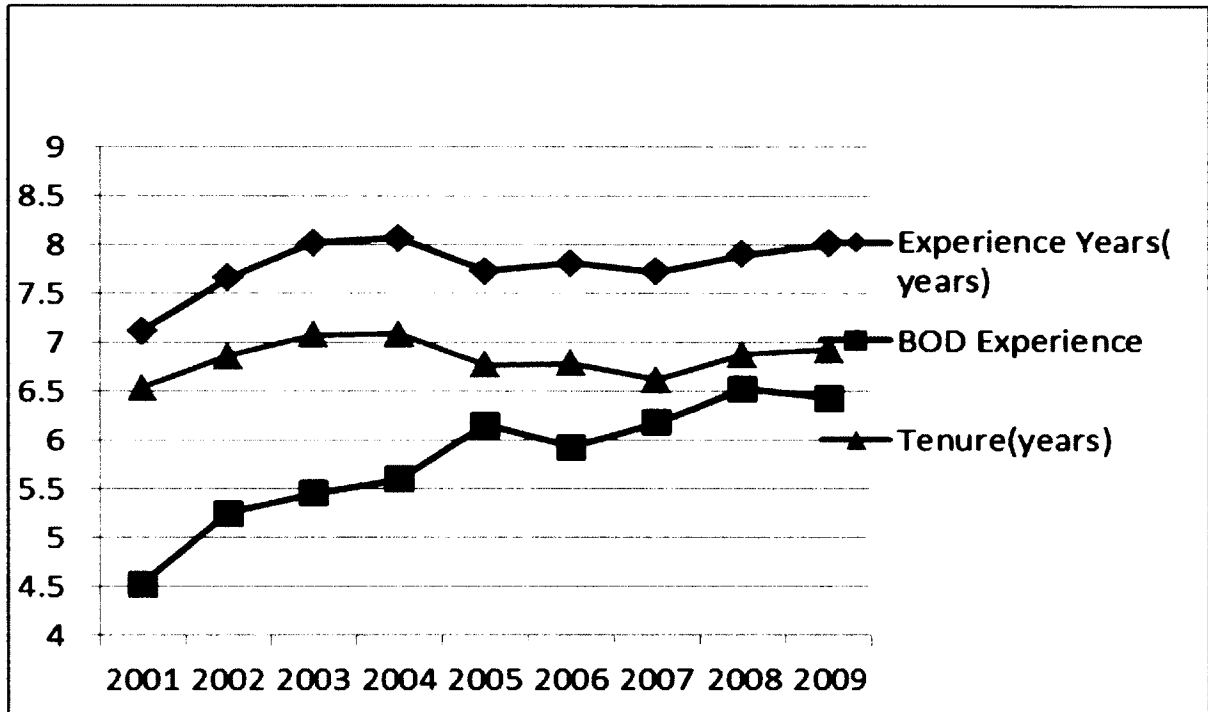
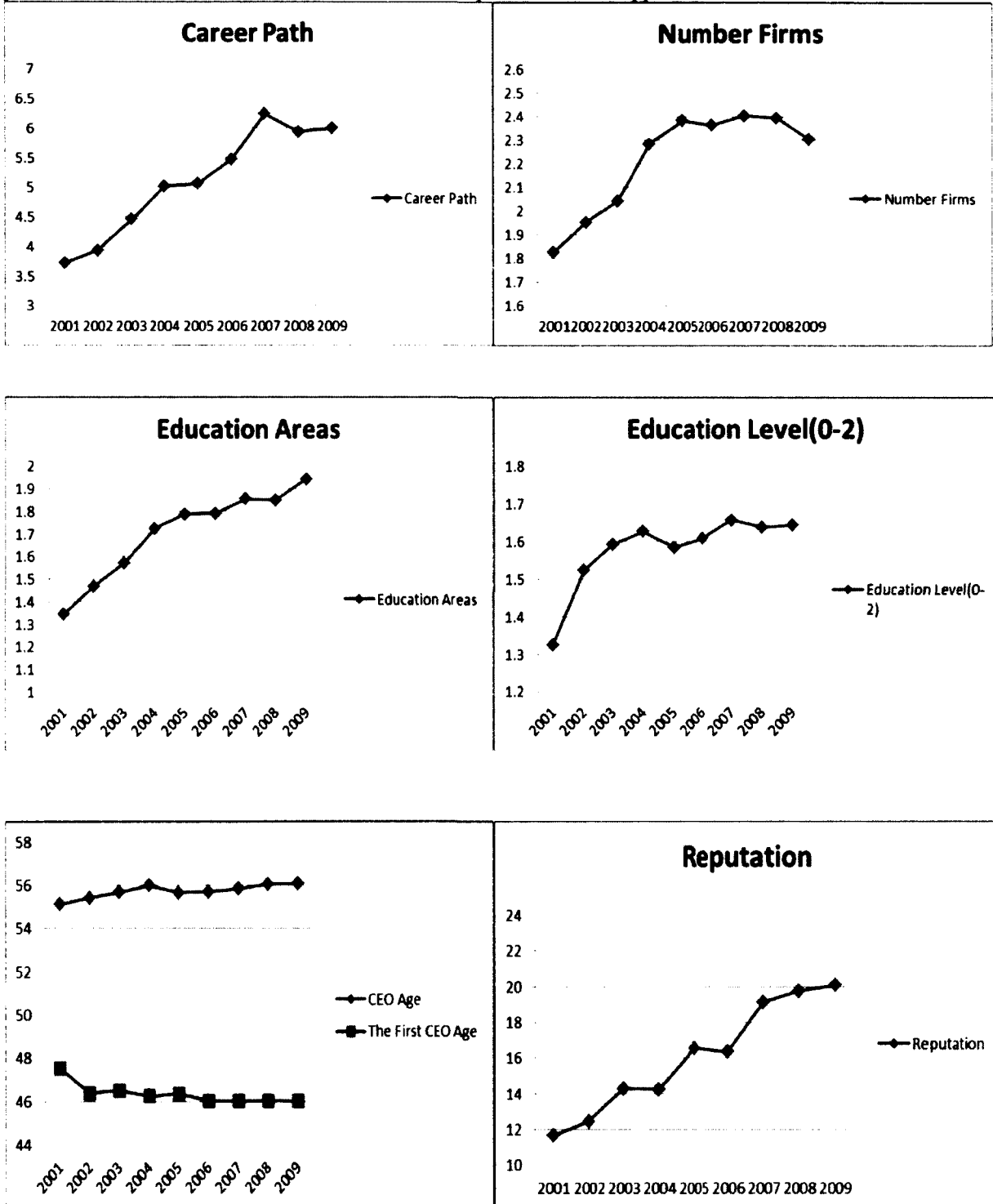


Figure 4

Other types of CEO human capital per year from 2001 to 2009. All variables are winsorized at the 5th and 95th percentiles. Variable definitions and data sources are provided in the Appendix.



Appendix: Methodology for Variables

Human Capital Measure: Using CEOs in S&P 500 firms, I proxy for their human capital as below. Some CEOs with degrees belonging to more than one group are classified in multiple categories.

Panel A: General Human Capital Variables

Variable	Description
Experience Years	Number of years which CEO has worked as a CEO.
Career Path	Number of career path CEO has had on past work experience in publicly traded firms.
Number Firms	Number of firms where CEO has worked based on past work experience in publicly traded firms.
General Work Experience dummy	Dummy variable that takes the value of one if the number of industries (two-digit SIC) where a CEO worked based on his work experience in publicly-listed firms prior to the current position is greater than one ,otherwise 0
BOD Experience	Number of years which CEO has worked on the board of directors on past work experience.
Education Areas	The number of areas which CEOs have studies during their career.
Education level	The education level of CEO has earned the education degrees before becoming the CEO. When CEO's education got above master or MBA degree, then the dummy variable is 2; or when CEO's education got the Bachelor degree, then 1; otherwise 0
CEO_age	Age of the CEO.I also separate groups in the indicated age range (-52,53-55,56-59,60-62,63-92)
The First CEO age	CEO age when CEO starts to work as a CEO position.
Previous financial career	if CEOs' main previous career is financial institutions and financial consulting firms then 1, otherwise 0
Previous Accounting career	If CEOs previously worked as a CFO, treasurer, accountant, or other related professional in a firm then 1, otherwise 0
Previous technological career	if CEOs are individual patent holders, or if they previously worked as an engineer or other technically oriented professional then 1, otherwise 0
Previous management career	if CEOs' main previous career is related with various management team then 1, otherwise 0
Previous law career	if CEOs' main previous career is related with law area then 1, otherwise 0
Previous financial education	if CEOs' main previous education is financial area(undergraduate or graduate degrees in accounting, finance, and economics) then 1, otherwise 0
Previous Business Administration education	if CEOs' main previous education is business administration area(undergraduate degree in business. marketing, management or MBA) then 1, otherwise 0
Previous technological education	if CEOs' main previous education is technological area(degrees in engineering or the natural sciences) then 1, otherwise 0

<i>Previous law education</i>	if CEOs' main previous education is law area(degree in law) then 1, otherwise 0
<i>US Reputation</i>	the number of articles in the major US in which the CEO's named in the S&P 500
<i>International Reputation</i>	the number of articles in the major global business in which the CEO's named in the S &P 500
<i>Wireless Reputation</i>	the number of articles in the major wire services in which the CEO's named in the S &P 500
<i>Reputation</i>	the number of articles in the whole media (3*the number of articles with positive tone + the number of articles with neutral tone- the number of articles with negative tone)

Panel B: Firm-specific Human Capital Variables

Variable	Description
<i>Tenure</i>	CEO's firm experience Prospectuses Tenure or number of years the CEO has been working for the current company.
<i>Internal Hires</i>	Dummy variable which if industries where CEO has worked previously bases on past CEO job experience are the same as the current company, then 0, otherwise 1)
<i>Founder</i>	If family-firms are defined as those in which one or more family members are CEO or directors, or own 5% or more of the firm's equity, either individually or as a group then 1, otherwise 0

Panel C: CEO Characteristics

Variable	Description
<i>CEO=Chair</i>	Dummy variable which if CEO is also chair of the board, then 1 and zero otherwise.
<i>CEO Power</i>	CEO total compensation/ Five executive members' total compensation.
<i>Gender</i>	Dummy variable that If the gender of CEOs are male, then 0 female 1
<i>Industry Change</i>	CEO's industry change in the current firm from the previous firm based on SIC 2 code.(Dummy variable which if industries where CEO has worked previously bases on past CEO job experience are the same as the current company, then 0, otherwise 1)

Panel D: Firm Characteristics

Variable	Description
<i>Stock Return</i>	(the market-based measure of firm performance)Return on Stock: Shareholder Total Return = Capital Gains + Dividends
<i>ROA</i>	(the accounting-based measure of firm performance)To reward CEO effort, firms base the long term compensation on firm performance for the year. The earnings can affect the ability of a firm to pay cash compensation. So we use ROA to measure firm performance. =EBITDA/lagged assets
<i>Firm size</i> $\ln(\text{size})_{it}$	We measure firms' size using market capitalization firms' sales revenue data.

Leverage	Industry adjusted total debt divided by total assets (Compustat TD/AT)
Tobin's Q	Sum of total assets plus market value of equity minus book value of equity divided by total assets (Compustat (AT+CSHOxPRCC_F-CEQ)/AT)).
R&D	R&D expenses (Compustat XRD).
CAPEX	Capital expenditures divided by total assets (CAPX/AT).
Loss	One if the company reports a net loss(Compustat #172); zero otherwise
Growth	The percentage change of sales over two years.
SG&A	Selling, general, and administrative costs (Compustat # 189)
Sales	Log of Sales Revenues in thousands of US\$ (Compustat REVT).
Diversification	Dummy variable that takes a value of one if a firm has more than one business segment, and zero otherwise (Compustat).

Panel E: CEO Compensation

Variable	Description
Total compensation	Measured by total compensation pay of CEO for firms (stock option + salary + bonus). Bonuses were relatively fixed component pay (Jensen and Murphy, 1990). Total compensation composed of cash plus long-term compensation. Stock option was valued using the Black-Scholes method. To adjust for inflation, compensation data were deflated to 2008 dollars using the CPI index (US department of labor)
Cash compensation	Salary plus bonus in thousand \$ (Execucomp TOTAL_CURR).
Equity compensation	Value of restricted stock granted plus value of options granted in thousand \$ (Execucomp RSTKGRNT + OPTION_AWARDS_BLK_VALUE).
Salary compensation	Salary in thousand \$ (Execucomp salary).
Bonus compensation	Bonus in thousand \$ (Execucomp bonus).
Log changes in Salary	$\ln(\text{salary})_t - \ln(\text{salary})_{t-1}$.
Log changes in Bonus	$\ln(\text{bonus})_t - \ln(\text{bonus})_{t-1}$.
Log changes in Cash Compensation	$\ln(\text{TOTAL_CURR})_t - \ln(\text{TOTAL_CURR})_{t-1}$.
Log changes in Total Compensation	$\ln(\text{TDC2})_t - \ln(\text{TDC2})_{t-1}$.

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Ph. D in Accounting, Drexel University, Philadelphia, PA, USA
 MA in Economics (concentrated on Financial Economics), State University of
 New York at Buffalo, Buffalo, NY, USA (September 2007)
 BS in Mathematics (Minor in Economics, Business), University of
 Arizona, Tucson, USA (August 2003)

EXPERIENCE

Teaching

Teaching Assistant, Intermediate Accounting 1, Drexel University (2 sections) –
 Fall 2010, Winter 2011
 Teaching Assistant, International Economics, State University of New York at
 Buffalo- Spring 2007
 Grader, Business math, Basic Statistic, Calculus 2, University of Arizona (2001~2003)

Research

Research Assistant, Drexel University (2008 - 2011)
 Research Assistant, State University of New York at Buffalo (2007)

Professional

Vice-Controller, GM (2007 ~ 2008)
 Financial Analyst, Samsung Electronics Thales Co.Ltd. (2003 ~ 2005)
 Volunteer, Red Cross(09/1999 ~ 07/2000)
 Squad Commander of Foreman Construction Battalion, 30division, Sergeant (1997
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HONORS AND AWARDS

CMA(Certified Management Accountant) Doctoral Scholarship (2012)
 Drexel University Graduate Assistantship (2008 - 2011)
 State University of New York at Buffalo Graduate Assistantship (2007)
 Fellowship from Rotary International, Dean's List. (2003)
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PROFESSIONAL AFFILIATIONS

American Accounting Association

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