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CEO Managerial Ability, Corporate Investment Quality, and the Value of Cash

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A dissertation submitted in partial fulfillment of the requirements for the degree of the Doctor of Philosophy in Business (Concentration in Accounting) at Virginia Commonwealth University.

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TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

CEO MANAGERIAL ABILITY, CORPORATE INVESTMENT QUALITY, AND THE VALUE OF CASH

By Huiqi Gan, Ph.D.

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This study investigates how CEO managerial ability affects investment quality, investment efficiency, and the value of cash. Specifically, I examine whether higher managerial ability is associated with higher M&A quality, more efficient capital investments, and higher value of cash. Investment decision-making and implementation can signal a CEO's managerial ability (Stein 2003), and shareholders assign more value to the cash of those firms with high ability CEOs. Thus, I predict that more able CEOs conduct higher quality M&A and make more efficient capital investment decisions. I also propose that the value of cash is higher for firms with more able CEOs. Using the methodology developed in Demerjian et al. (2012) to estimate CEO managerial ability, I find that the M&As conducted by more able CEOs are less likely to experience goodwill impairment and divestitures in the post-acquisition period. I also find that

managerial ability, to a certain extent, can improve capital investment efficiency when firms have a higher likelihood of over- or under-investment. Furthermore, I provide evidence that cash has higher value if it is managed by more able CEOs. Overall, my findings suggest that while managerial ability plays a limited role in improving M&A quality, it significantly increases capital investment efficiency and the value of cash.

CHAPTER 1 INTRODUCTION

Agency problems, such as moral hazards and adverse selection issues, are persistent when ownership and control rights are separated and can be exaggerated when the interests of the principal and the agent diverge (e.g., Jensen and Meckling 1976; Myers and Majluf 1984; Jensen 1986). The agent can make corporate decisions at the expense of shareholders' welfare in order to pursue his own interests. For example, Jensen (1986) contends that empire-building managers tend to make sub-optimal investment decisions when they have free cash flow, regardless of whether those investments would enhance firm value. Shleifer and Vishny (1989) and Morck et al. (1990) show that managers make manager-specific investments so that they are less easily replaceable and their jobs are more secure. Considering the crucial role that top managers play in managing corporations, and given this principal-agent context, it is important to study how the characteristics of top managers, especially the Chief Executive Officer (CEO, hereafter), affect corporate investment practices and outcomes.

The upper echelons theory (e.g., Hambrick and Mason 1984) states that behavioral factors are influential in complex decisions in a corporate context. Generally speaking, strategic decisions and organizational outcomes are, to some degree, predicted by CEO managerial characteristics (Hambrick and Mason 1984). By separating unobserved manager-fixed effects from firm-fixed effects on the managers' turnover sample, Bertrand and Schoar (2003) find that

a significant part of the heterogeneity in firms' investment practices can be explained by the unobserved manager-fixed effects, which is consistent with Hambrick and Mason (1984).

Although the board has the ultimate power to determine the policy on capital investments, it usually delegates the administration of investment practices to its agent, the CEO (Hill 1995). Therefore, CEOs bear the responsibility of initiating, evaluating, and overseeing the progress of investments (Lehn and Zhao 2006). This study thus investigates how CEO managerial ability affects investment decisions and corporate investment quality. This study also examines how the value of cash varies with CEO managerial ability. Stein (2003) argues that investment decision-making and implementation signal a CEO's managerial ability. The ability to select and implement high quality investments can be inferred by the capability and efficiency of running a firm. Considering that firms pay a higher compensation premium to attract and retain higher ability CEOs (Custodio et al. 2013), it is of great interest to study whether managerial ability brings the benefit of improving investment quality, investment efficiency, and the value of cash.

Investment is one of the most important corporate activities, having the same objective as other corporate practices – to maximize firm value. Exhaustive capital budgeting procedures in firms are solid evidence of the importance of controlling investment practices (Holmstrom and Costa 1986). Inferior investment decisions harm shareholder wealth because they not only waste significant resources, but also result in negative impacts in the long run. In addition, inferior investments can lead to unexpected consequences. For example, Bens et al. (2012) show that investment-related pressure can cause misreporting. Specifically, they find that acquiring firms who experienced more negative stock returns around M&A announcements have a higher likelihood of distortion of their financial statements in the post-acquisition period.

In this research, I adopt the methodology developed in Demerjian et al. (2012) to estimate CEO managerial ability. Based on the assumption that more able CEOs generate higher revenue from a given level of resources, Demerjian et al. (2012) construct a direct measure of managerial ability to capture a CEO's efficiency in managing the firm and producing revenue. This measure indicates a CEO's managerial ability to produce more revenue while consuming fewer resources than his/her peers in the same industry. Such efficiency refers to the capability of value creation, value management, and value enhancement in corporate management, a capability that can ensure companies' productivity and create shareholder value (Copeland et al. 1994). Therefore, I conjecture that a CEO's managerial ability is positively associated with his/her firm's investment quality and efficiency.

I first examine the association between managerial ability and the quality of mergers and acquisitions (M&A, hereafter). M&A are among the most important investment decisions and usually demand significant resources. Successful M&As can be a key factor of a firm's strategic development plan, supports the superior growth of the firm, and eventually increases firm value (Copeland et al. 1994; Weston and Weaver 2001). However, evidence suggested by the literature on M&A (e.g., Healy et al. 1992; Agrawal and Jaffe 2000; Ghosh 2001; Moeller et al. 2004; Fee and Thomas 2004) reveals that the quality of M&A activities and their effects on subsequent firm performance vary widely. As *ex ante* evidence, capital market research on stock market reactions to M&A announcements shows that, although shareholders of the target-firms generally enjoy positive short-term returns, shareholders of acquiring firms frequently experience stock returns not significantly different from zero and even negative drifts in the months following acquisition (Agrawal and Jaffe 2000). This finding is further supported by a small positive stock return to acquiring firms and a negative average dollar change in the wealth

of the acquiring firms' shareholders as documented in Moeller et al. (2004). In terms of *ex post* evidence, firms' post-M&A performances are mixed. Jensen and Ruback (1983) report a negative drift in the stock price of acquiring firms several years after acquisition. The comprehensive review of post-M&A performance in Agrawal and Jaffe (2000) concludes that the long-run stock performance of acquiring firms is typically negative or, at best, not statistically different from zero. While Ghosh (2001) finds that operating performance does not improve after M&A, Healy et al. (1992) and Fee and Thomas (2004) provide evidence of improved performance after M&A.

High ability CEOs make M&A decisions by taking firms' strategic plans, available resources, industry characteristics, and the macroeconomic environment into consideration. In addition, with better knowledge of the underlying value of the existing business, including cost and revenue drivers, and better techniques of evaluating both existing and potential businesses, high ability CEOs are likely to make M&A that fit their firms' strategy. In this sense, if an acquiring firm hires a high ability CEO, the firm is likely to experience less negative stock market performance or improved performance in the post-M&A periods. Thus, I predict that talented CEOs are more likely to make higher quality M&A decisions than less able CEOs.

To proxy for M&A quality, I use the following four estimates of M&A quality suggested by prior studies (e.g., Francis and Martin 2010; Goodman et al. 2013): 1) Market reaction to M&A announcements is employed as an *ex ante* estimate of M&A quality, assuming the market provides unbiased valuation and insights about the quality of M&A and the probability of their success; 2) three other *ex post* estimates, including the post-acquisition change in operating performance (ROA and operating cash flow), the likelihood and the magnitude of goodwill impairment in the post-acquisition period, and the probability of divestiture.

I find that the M&A conducted by more able CEOs are less likely to experience goodwill impairment and divestiture in the post-acquisition period. I also find that managerial ability score is negatively associated with the post-acquisition change in operating cash flow. This result may be due to declining performance arising from a high frequency of M&A.[1] I, however, do not find significant results when using the 3-day stock market reaction, the post-acquisition change in ROA, and the magnitude of goodwill impairment as proxies for M&A quality.

Next, I investigate the association between CEO managerial ability and corporate capital investment efficiency. Specifically, I examine whether CEO managerial ability improves capital investment decisions when firms have the tendency to under-invest or over-invest by testing the conditional relation between capital investments and CEO managerial ability. Capital investments are undertaken to promote constant growth for companies by developing cutting-edge knowledge, products, and technology that provide firms with competitive advantages. Nevertheless, prior literature documents that, due to agency problems and information asymmetry, it is not uncommon for firms to deviate from efficient capital investment levels, resulting in over-investment or under-investment (e.g., Jensen 1986; Richardson 2006; Biddle et al. 2006; McNichols and Stubben 2008; Biddle et al. 2009). Particularly, Biddle et al. (2009) provide empirical evidence that reduced information asymmetry resulting from good quality of financial reporting can enhance investment efficiency.

Higher ability CEOs are perceived to have better knowledge, skill sets, and judgment to anticipate future changes than their peers (Trueman 1986). CEOs who have the ability of efficiently managing a firm should make efficient capital investments because capital

[1] Untabulated results show that the average managerial ability score and ranking for a firm over the sample period from 1993 to 2011 is positively correlated with the frequency of M&As made by that firm. Conn, Cosh, Guest, and Hugues (2004) find that there are significant declines in short and long run performance for acquiring firms that conduct repeated M&As, which could be due to the difficulty of integrating subsequent acquisitions within the short time period between acquisitions.

investments are the inputs supporting revenue growth. Therefore, I predict that more able CEOs make more efficient capital investment decisions. In this study, I look at the efficiency of total capital investments and the main components of total capital investments: capital expenditures, research and development expenditures (R&D, hereafter), and acquisition expenditures. Specifically, I use the actual levels and the abnormal levels of these four measures as proxies for capital investments efficiency.

Consistent with my predictions, I find that, when firms are most likely to under-invest, higher ability CEOs tend to increase the investment in R&D, acquisition expenditures, and total capital investments. On the other hand, when firms have a higher likelihood of over-investing, high ability CEOs tend to reduce the levels of the acquisition expenditures and total capital investments. However, this is not the case for capital expenditures. Specifically, I find that higher ability CEOs increase capital expenditures when firms are more likely to over-invest, indicating lower investment efficiency. Furthermore, the results show that talented CEOs increase the abnormal level of total capital investments, the abnormal level of R&D, and the abnormal level of acquisition expenditures when firms are most likely to under-invest, and decrease the abnormal level of total capital investments, the abnormal level of R&D, and the abnormal level of acquisition expenditures as firms' likelihood of over-investing increases. Together, these results suggest that, to some extent, higher ability CEOs in general improve capital investment efficiency when firms have a tendency to under-invest or over-invest.

Finally, I examine the effect of managerial ability on the value of cash. I conjecture that the value of cash is positively associated with managerial ability. Cash is an important source of internal capital that is under the control of CEOs. The decision on how to deploy cash is at the discretion of management (Liu and Mauer 2011). CEOs can choose to keep cash in the firm,

distribute it to shareholders, or make use of it to fund investments. Thus, the value of cash differs depending on the ways that CEOs use it, its availability, and the cost of external financing (e.g., Myers and Majluf 1984; Jensen 1986; Fazzari et al. 1988; Pinkowitz and Williamson 2004). More able CEOs are likely to create greater value in cash by making better use of it, i.e., engaging in efficient and high quality investment activities. Therefore, I predict that, holding other things constant, the value of cash will be higher if it is managed by more able CEOs.

Using the regression model developed in Faulkender and Wang (2006), I find that CEO managerial ability significantly increases the marginal value of cash. This finding is further substantiated by sub-sample analysis of financially constrained and unconstrained firms. The value of cash is typically lower if firms are financially unconstrained, because value-increasing investments can be funded through external capital and cash is not an urgent need (e.g., Myers and Majluf 1984; Fazzari et al. 1988; Faulkender and Wang 2006). The finding of my study shows that managerial ability can greatly increase the value of cash for firms that are not financially constrained, i.e., when firms have good credit ratings.

This study makes two significant contributions. First, by providing evidence on how managerial ability influences investment decision-making using a comprehensive managerial ability measure, this study contributes to the literature on how individual-level factors affect corporate-level decisions and outcomes, which is consistent with the upper echelons theory in Hambrick and Mason (1984). With various proxies for managerial ability, prior research has shown that better CEOs are associated with better firm performance (e.g., Chang et al. 2010), more frequent management forecasts (Baik et al. 2011), and higher quality of accounting information (Francis et al. 2008; Demerjian et al. 2013). The results of this study add to this stream of literature by showing that CEO managerial ability has a certain impact on investment

quality and can improve capital investment efficiency. In addition, as M&A and capital investment decisions closely relate to firms' strategic plans and future growth opportunities, the findings from this study shed light on the effect of higher ability CEOs on supporting the firm strategic development and growth.

Second, the evidence of management talent positively impacting the value of cash has implications for better understanding about the role of CEO individual factors (i.e., managerial ability) in enhancing the value of internal capital. Cash is the lifeblood of a firm, especially in the post-financial crisis period. Prior research on the value of cash mainly focuses on firm-level factors, such as growth opportunities, investment options, and the external capital environment (e.g., Jensen 1986; Fazzari et al. 1988; Myers and Majluf 1984; Pinkowitz and Williamson 2004; Faulkender and Wang 2006; Richardson 2006). As the controller of cash in the firm, a CEO's utilization of available cash directly impacts firm value. In this sense, this study provides a fresh perspective by showing that a firm's cash displays higher value if it is managed by more able CEOs, thus being consistent with the view that shareholders consider the ability of a CEO when they evaluate cash.

The remainder of this paper is organized as follows. In the next two sections (Section II and Section III), I review the prior literature and generate hypotheses. I then discuss research design in Section IV and present the results in Section V. I discuss conclusions in Section VI.

CHAPTER 2 LITERATURE REVIEW

2.1 Agency problems in the corporate investment context

The neoclassical theory of corporate investment predicts that the optimal investment policy for a firm is to invest until the marginal benefit equals the marginal cost, assuming management is seeking to maximize shareholders' welfare (Tobin and Brainard 1977). In this sense, in order to maximize the benefit to shareholders, any project with positive net present value (NPV, hereafter) should be undertaken either through financing channels or using available cash, and all negative NPV projects should be rejected; any excess cash should be returned to the principal (Tobin and Brainard 1977; Jensen 1986; Biddle et al. 2009). Inconsistent with this ideal situation, prior literature identifies the possibility that decisions on investments, such as M&A, capital expenditures, and research and development expenditures (R&D, hereafter), may not be consistently made in the best interest of shareholders due to agency problems arising from the separation of ownership and control; rather, information asymmetry and possible conflicting interests between the principal and the agent can lead the agent to pursue his private benefit and sacrifice the principal's best interest (Jensen and Meckling 1976; Jensen 1986).

According to Jensen and Meckling (1976), even though appropriate incentives can be established to minimize the divergence of interests between the principal and the agent so that those interests can be aligned, disparities remain between the agent's actual decisions and the decisions that would maximize the welfare of the principal given the optimal monitoring enforced by the principal. Such disparities can be driven by various personal incentives of

managers, especially when the conflicting interests between the principal and the agent are exaggerated. One incentive is known as empire-building. Jensen (1986) posits that if they have free cash, managers who are building an empire prefer to make acquisitions or over-invest rather than increase payouts to shareholders because returning cash to shareholders can reduce the resources under those managers' control, resulting in a reduction of their power. These acquisitions or over-investments can have little benefit and even be value-destroying. Firms operated by such managers usually grow beyond their optimal size (Jensen 1986).

Shleifer and Vishny (1989) theorize another management incentive that can lead to sub-optimal investment. In order to make themselves more valuable to shareholders and more costly to replace, managers may direct their firms to invest in particular assets whose value is higher under their operations than under better managers, even when such investments are not value-maximizing (Shleifer and Vishny 1989). Shleifer and Vishny (1989) refer to such phenomena as management entrenchment, and pursuit of such entrenchment often leads to an excessive expansion of existing lines of business and overpaying for targets in M&A cases, especially when the bidder firms are under-performing and their managers are under turnover threat (Shleifer and Vishny 1989). In a similar vein, Morck et al. (1990) suggest that managers purposefully choose certain investments and overpay for them if there are private benefits to managers such as enhancing long term promotion, varying human capital risk, and augmenting job security, even when those kinds of investments can sacrifice the market value of firms. As the empirical evidence of bidding managers' private incentive driving low value M&A, Morck et al. (1990) show that their stocks perform poorly when bidders invest in unrelated business, acquire rapidly growing targets, and have bad firm performance before M&A.

Fahlenbrach (2009) finds that the entrenchment issue also exists in founder-CEO firms. Conjecturing that the investment behavior of founder-CEO firms can exhibit different patterns from that of successor-CEO firms because founder-CEOs have innate motivation, higher equity stake, greater influence, and more decision execution power over their firms, Fahlenbrach (2009) finds that founder-CEOs invest in more R&D, carry out higher capital expenditures, and conduct more focused M&A; however, most of those investments are not necessarily value-enhancing and can imply over-investment problems (Fahlenbrach 2009).

Career concern is another private incentive of managers identified by prior literature that can cause potential incongruity in the interests of managers and shareholders. Since management ability is signaled mainly through firm performance and managers have private information about the profitability and benefit in terms of investments, they will try to impact outside party's learning and evaluation process about their ability by their choice of project selections (Narayanan 1985; Holmstrom and Costa 1986). Due to career concerns, managers are motivated to build up and maintain their reputation (Hirshleifer 1993). To do this, managers can purposefully choose projects that produce short-term profits so that their ability can be evaluated and their compensation will be raised, ignoring the long-term interests of their firms (Narayanan 1985; Holmstrom and Costa 1986; Hirshleifer 1993). As well, in order to maintain their established reputation, managers can engage in myopic investment behavior. For instance, Kanodia et al. (1989) argue that, because of information asymmetry between managers and shareholders, managers want their ability, reputation, and other human capital to be informed by shareholders through managers' actions. Such reputation effects can distort preferences over actions. As a result, managers are likely to continue supporting poorly performing projects to avoid detrimental reputation consequences from project abandonment (Kanodia et al. 1989).

Hirshleifer and Thakor (1992) demonstrate managers' reputation incentive in making investment decisions from another perspective. Since a manager's ability to pinpoint favorable investment opportunities is vital to the firm but is typically only known to the manager, making observable success or failure of investments is the major channel through which this manager's ability can be inferred; consequently, managers can bypass high value and high risk investment opportunities and accept relatively safe and low value projects so that early failure of the investment is less likely occur (Hirshleifer and Thakor 1992).

Lastly, both Bliss and Rosen (2001) and Harford and Li (2007) propose another possible motivation that can drive managers to make M&A decisions that deviate from maximizing shareholder value: managers' compensation following M&A. Bliss and Rosen (2001) show that CEO wealth typically improves following a large bank merger even if the stock of the bidder performs poorly. In a similar vein, Harford and Li (2007) find that even in mergers in which bidding shareholders' wealth is impaired, bidding CEOs are still better off three quarters following the mergers. While CEOs' overall wealth is sensitive to positive stock performance, it is insensitive to negative stock performance after M&A because any negative effect is offset by large grants of new stock and options subsequent to M&A activities as rewards for growth (Harford and Li 2007).[2]

The under-performance phenomena after M&A evident from empirical studies indicates the failure of firm value maximization in investment activities due to the agency problems discussed above. For instance, by examining the literature on long-run abnormal returns following M&A, Agrawal and Jaffer (2000) conclude that M&A activities appear to provide, at most, mixed benefits to the involved stakeholders. Specifically, although shareholders of

[2] Harford and Li (2007)'s empirical evidence shows that the insensitivity of CEO wealth to poor M&A decisions can be corrected by stronger corporate governance to some degree; bidding firms with stronger boards tend to make their CEO compensation sensitive to poor performance subsequent to the merger.

acquired-firms generally enjoy positive short-term returns, shareholders in acquiring firms often experience under-performance in terms of their share price after M&A (Agrawal and Jaffe 2000). According to Agrawal and Jaffe (2000), in the relationship analyses of short-term stock return and long-term stock return for M&A cases, if the proposition that markets react slowly to merger news is correct, then this relation should be positive. That is, a high (low) return around a M&A announcement should be accompanied with a high (low) return following its completion. If the proposition that the market overreacts to the merger event is correct, the relation should be negative. There should be no relation if the post-M&A under-performance is due to factors unrelated to the M&A. The results support the prediction that the stock markets overreact to M&A announcements. In addition, based on the context that capital investment inefficiency can result from information asymmetry due to the separation of control rights and ownership, Biddle and Hilary (2006) and Biddle et al. (2009) show evidence that higher financial reporting quality can alleviate the capital investment inefficiency problem by reducing information asymmetry, thus mitigating the moral hazard and adverse selection problems between firms and outside capital providers. Particularly, Biddle et al. (2009) find that higher financial reporting quality can improve the capital investment efficiency of firms that operate in highly likely over-investment or highly likely under-investment environments, making their capital investments closer to expected levels.

In sum, prior research contends that agency problems arising from the separation between ownership and control rights and potential conflicting interests between shareholders and managers lead managers to pursue their own incentives to the detriment of shareholders. This can result in sub-optimal decision making in the investment context, such as the practice of over-investment and under-investment, investing in negative NPV projects, overpaying for

acquisitions, conducting value-destroying M&A activities, and delaying the abandonment of losing projects.

2.2 CEO personal characteristics and corporate investment practice

Although big investment decisions, such as M&A, R&D, and capital expenditure, are finally approved by a firm's board of directors, they are usually initiated, evaluated, and implemented by the CEO. In other words, CEOs are mainly responsible for investment activities and the large variation in the valuation effects related to investment decisions (Lehn and Zhao 2006). As discussed above, the agency problems arising from the separation between ownership and control rights can preclude the CEO from acting in the best interest of shareholders when the CEO pursues his own personal benefits. Therefore, it is important and interesting to study how CEOs and their personalities affect corporate investment practices.

According to the upper echelons theory proposed in Hambrick and Mason (1984), complex decisions are largely the results of behavioral factors, and decisions usually reflect the idiosyncrasies of decision-makers to some degree. When making a decision, the decision-maker usually brings in a cognitive base and their own values. The cognitive base is reflected through anticipation of future events, insight about alternatives, and estimates about consequences related to those alternatives (March and Simon 1958; Hambrick and Mason 1984). When elaborating on the relation between upper echelons characteristics and firms' strategic choices, Hambrick and Mason explain that both psychological aspects, such as cognitive base values, and observable background characteristics (i.e., age, education, and financial position), can affect the decision-maker's strategic choices on product innovation, potential acquisition opportunities, capital intensity, and forward integration (Hambrick and Mason 1984). In sum, the theory in Hambrick and Mason (1984) maintains that organizational outcomes, including strategic decisions and

corporate performance, are partially predicated and determined by CEO managerial characteristics.

In studying managerial effects, some of the studies utilize management turnover events to identify how top managers influence corporate investment practices. For example, to capture the unobserved manager-fixed effects, Bertrand and Schoar (2003) separate the manager-fixed effects from the firm-fixed effects using turnover samples, and find that a significant extent of the heterogeneity in corporate investment activities can be explained by the unobserved manager-fixed effects. In order to investigate CEOs' significant influence on the levels and quality of general investments, Hornstein (2013) uses empirical data to track investment patterns before, during, and after CEO turnover. The results of Hornstein (2013) show that firms exhibit a pattern of over-investing prior to CEO turnover; though investments pause around the turnover period, the level of expenditures typically rises after the turnover. Further, forced CEO turnovers are more likely to occur in more severe over-investment circumstances, and investment decisions are generally more efficient following those forced turnovers (Hornstein 2013). According to Hornstein, the findings uncovered in those CEO turnover analyses complement prior research about the CEO influence on the efficiency of corporate investments and capital budgeting decisions due to idiosyncratic factors and incentives of the individual.

Instead of using turnover events to capture manager effects, Barker and Mueller (2002) study certain observed CEO characteristics and how they relate to firms' R&D level. For the majority of firms, R&D is one of the important investment decisions made by CEOs. Such investments are considered to be the impetus in developing new products, refining, improving, and innovating processes and technologies, and driving the growth opportunities and future development of firms. The work of Barker and Mueller (2002) provides evidence on how CEO

characteristics play a role in the pattern of R&D investments after taking firm strategy, ownership structure, and other firm characteristics into account. More specifically, with a sample of publicly traded firms, Barker and Mueller (2002) show that CEO characteristics explain significant variance in firm R&D practices – the level of R&D is negatively related to CEO age, and positively related to CEO shareholding in the company, career experience especially in marketing and engineering, advanced science-related degrees, and tenure. Using CEO tenure, the number of times a CEO's name is mentioned in business articles, and industry-adjusted firm performance as proxies for CEO reputation, Jian and Lee (2011) show that stock markets react more positively to the announcements of capital investments made by CEOs with a higher reputation, supporting the assertion that more reputable CEOs pursue more valuable projects which are more likely to support firms' future development and cash flow generation, and the stock market recognizes this favorable prospect.

There is a stream of literature investigating how the hubris and overconfidence attributes of CEOs prompt them to engage in M&A. Roll (1986) first proposes that M&A can be purely due to managers' hubris. According to Roll (1986), the hubris characteristic of managers may drive them to over-estimate the value of M&A when they are using private information to assess the economic consequence of synergies and future performance. If it is the case, a price decline when announcing a bid, a price increase when forgoing or losing a bid, and a price decline when finally winning a bid are all predicted (Roll 1986). After collecting and analyzing previous empirical studies on M&A, Roll (1986) believes that the hubris hypothesis is supported and explains the phenomena of overall small gains, absolute dollar values are not significantly different from zero, and abnormal returns are negative in certain M&A circumstances.

Inspired by the hubris hypothesis, later works investigate a closely related attribute to hubris, overconfidence, and its impact on corporate investment practices such as M&A, capital expenditures, and R&D. For example, as stated by Doukas and Petmezas (2007) and Malmendier and Tate (2008), overconfident CEOs believe in their exceptional decision-making and execution abilities. With that cognitive bias, overconfident CEOs can become obsessive and engage in highly perplexing business activities such as diversifying and value-destroying acquisitions and overpaying for target companies. Particularly, using high order acquisition deals (the number of M&A they conducted within a short time range) and increasing ownership stake of insiders as two measures for overconfidence, Doukas and Petmezas (2007) provide evidence showing that overconfident bidders generally realize lower announcement returns and long-run performance than rational bidders. In a similar vein, using the scenario of CEO over-investment and CEO press portrayal as two proxies for overconfidence, Malmendier and Tate (2008) find that the likelihood of making an acquisition is 65% higher for a overonficent CEO, and that the stock reaction to M&A announcements is significantly less favorable if the M&A are conducted by overconfident CEOs. In addition, Malmendier and Tate (2008) show that when internal resources are sufficient, overconfident CEOs are more likely to initiate and pursue diversifying rather than non-diversifying M&A. Extending the U.S. evidence to international cases, Ferris et al. (2013) study a sample of CEOs of Fortune Global 500 firms from 2000 to 2006 and find that CEO overconfidence has incremental power in explaining the number of M&A offers, the density of making non-diversifying and diversifying acquisitions, and the use of cash payments in M&A activities.

Turning to the empirical evidence of irrational capital investment made by overconfident CEOs, Malmendier and Tate (2005) maintain that CEO overconfidence can cause distorting

investment practices in a corporate context. The results in Malmendier and Tate (2005) reveal that overconfident CEOs tend to over-invest when they have excess internal funds, because they overestimate the payback of the investment they choose, while they trim down investment when they have to resort to outside financing, in which case their company can be undervalued. In investigating whether overconfident CEOs achieve greater innovative success, Hirshleifer et al. (2012) show evidence that overconfident CEOs invest more in innovation and possess more patents and patent citations when R&D is controlled, but such results are only valid in innovative industries, indicating that overconfident CEOs exploit innovative growth opportunities (Hirshleifer et al. 2012).

In addition to the above empirical research, behavioral research methodology is also employed to study CEO personalities in a corporate investment context. For example, via measuring CEO personal characteristics through content analysis of speeches, questionnaires, and length of CEO biographies, Rovenpor (1993) proposes and provides weak to moderate evidence that higher levels of CEO beliefs that "bigger is better," beliefs in synergy," and need for power and self-confidence are significantly related to more frequent M&A activities. Using a survey instrument to study the role of individual heterogeneity in corporate investment and financing decision-making, Graham et al. (2013) show that CEOs who are more risk-tolerant are more likely to pursue M&As.

2.3 Managerial ability

The signal and impact of managerial ability have always been of great interest to academic researchers considering the central role of top management, especially CEOs and CFOs, in decision-making and corporate practice. By emphasizing the role of managerial characteristics in business practice, Lazear (1986) claims that a firm can expect the best outcome

only when a manager's ability and skill level match his firm's needs (Lazear 1986). Based on this theory, researchers in the accounting, finance, and management fields explore how managers signal their ability to the public and whether the individual variations in managerial talent have an incremental explanatory power to explain the variable levels of corporate decision quality, diverse firm practices, and economic outcomes.

One stream of accounting and finance literature uses market mechanisms to indicate managerial ability. Assuming the stock market is efficient, market reaction should incorporate investors' belief and expectation about a firm's CEO ability. Hayes and Schaefer (1999) show that firms losing CEOs to other firms experience more negative abnormal returns. In contrast, firms hiring CEOs away from other firms have significantly positive abnormal returns. In a similar vein, Chang et al. (2010) use firms' pre-departure performance and CEO pay to indicate CEOs' abilities. They show that the stock market reaction to CEO turnover is negatively associated with the firm's previous performance and the CEO's pay, and that better prior firm performance and higher CEO pay lead to a better subsequent labor market for the CEO. According to Chang et al. (2010), these results are consistent with the prediction that differences in firm performance do not entirely stem from firm specific effects but can be partly due to CEO factors. Milbourn (2003) claims that the stock price naturally indicates the probability of a current CEO being replaced in the future; stock prices can reflect the fact that one CEO with higher ability has a greater likelihood of being retained, thereby offering a more informative contracting mechanism, and vice versa. In addition, relying on the proposition that CEO ability can improve the credibility of management forecasts, Baik et al. (2011) show that the market reacts more to the news in management forecasts released by high ability CEOs than to those

released by relatively low ability CEOs. In sum, the stock market operates as if it reacts to indications managerial ability.

Another stream of study adopts indirect measures to proxy for managerial ability and capture the variation in levels of managerial ability. Management forecast quality has been used as a proxy for managerial ability. According to Trueman (1986), management earnings forecasts release a public signal of a manager's ability to expect future changes regarding the firm's business environment and microeconomic situation and adapt the firm's operations strategy appropriately. Farrell and Whidbee (2003) use forecast errors (implied ability of expectation management) to indicate CEOs' abilities because forecast errors can capture information about unexpected performance that the board attributes, to a large degree, to the CEOs' abilities. Similarly, Lee et al. (2012) find that the likelihood of CEO turnover is positively associated with the magnitude of forecast errors when firm performance is poor. Meanwhile, Goodman et al. (2013) show that a higher quality of management forecasts can improve their corporate investment decisions.

Other studies use CEO reputation as a proxy for managerial ability (e.g., Milhoum 2003; Rajgopal et al. 2006; Francis et al. 2008; and Baik et al. 2011), where CEO reputation is typically measured by the number of articles in the public press containing a CEO's name. Among these studies, Milhoum (2003) develops a model and empirically tests the prediction that CEO reputation is positively related to stock-based pay sensitivities. Francis et al. (2008) find a negative association between highly-reputed CEOs and lower discretionary accruals, indicating that CEO reputation has a positive impact on earnings quality. Using reputation as one of the managerial ability measures, Baik et al. (2011) find that the frequency of issuing management earnings forecast increases with CEO ability, implying that higher ability CEOs transmit more

information to the market than do low ability CEOs. As well, prior firm level performance has been used to proxy for managerial ability. According to Harris and Holmstrom's (1982) dynamic model of efficient wage contracts, managers work on the firm's behalf and generates observable output, through which firms can learn about a manger's ability over time. This theoretical argument has also been supported by empirical evidence of a positive association between managerial characteristics and firm performance (e.g., Rajgopal et al. 2006; Carter et al. 2010; Chang et al. 2010; Baik et al. 2011; Banker et al. 2013).

Though the above proxies can capture managerial ability to some degree, there is still a question if they are appropriate to comprehensively measure the CEO's managerial ability. If a measure of managerial ability is not exhaustive in its manner and managerial-specific effects are not fully considered and evaluated separately from firm-specific effects, any analyses using such proxies can be biased. Responding to this concern, Demerjian et al. (2012) propose and develop a method to capture managerial ability in a more comprehensive way by partitioning total efficiency into the firm level and manager individual-level efficiency. The managerial ability measure in Demerjian et al. (2012) reflects managers' efficiency compared to their industry peers in transforming corporate resources to revenues. Specifically, assuming that more able managers produce more revenue given a certain level of resources (or consume less resources to generate a certain level of revenue), Demerjian et al. (2012) maximize the revenue and minimize the revenue-generating resources, including cost of inventory, general and administrative expenses, fixed assets, operating leases, prior R&D, and intangible assets, to infer firms' overall efficiency in generating revenues. They then separate firm-level efficiency from managerial-level efficiency, resulting in CEO managerial ability. Demerjian et al. (2012) confirm the validity of this measure of managerial ability by showing a strong association between their measure and

manager fixed effects and a positive (negative) stock market reaction to CEO turnover when the outgoing CEO is considered to have low (high) ability as evaluated by this measure. Demerjian et al. (2012) also find that replacing CEOs with more (less) able CEOs enhance (diminish) subsequent firm performance. In another study, Demerjian et al. (2013) shows that earnings quality positively relates to managerial ability using the measure introduced by Demerjian et al. (2012). Baik et al. (2011), using the same measure of managerial ability, find their results are consistent across three measures of managerial ability.

2.4 The value of cash

In a frictionless context, companies can fund all investment opportunities, if those investments are believed to be value-increasing, using outside capital resources. In that case, investment decisions do not depend on the availability of internal capital (Modigliani and Miller 1958). However, in reality, market imperfections and agency problems make internal capital and external capital imperfect substitutes. If outside capital is too costly, firms will resort to their internal capital to fund their investments. As a result, firms value their cash differently and investment decisions may depend on the availability of internal financing (e.g., Fazzari et al. 1988). In this sense, free cash is an important factor affecting managers' investment decisions. According to Pinkowitz and Williamson (2004), higher value of cash is placed by shareholders whose firms have better and more volatile growth opportunities than those who have fewer and more stable growth opportunities.

The value of cash in a firm is affected by several factors. Generally speaking, if firms have high external capital costs, then cash, as one internal capital source, is valued more. This relation can be even stronger if firms face favorable investment opportunities. According to Myers and Majluf (1984), asymmetric information between investors and managers can make

external financing costly, in which case firms who identify valuable investment opportunities have to rely on internal capital resources. Facing costly external financing and lacking sufficient internal capital at the same time would result in bypassing positive NPV investment opportunities, resulting in under-investment. Thus, a dollar of cash held by a firm may be valued at more than a dollar by its shareholders (Myers and Majluf 1984). Empirical studies have shown that the value of cash is especially high in financially constrained firms. For instance, Fazzari et al. (1988) propose that when firms experience financing constraints, their investment decisions are not only subject to the evaluation of the prospects of the project, but they are also limited to the availability of internal funds. The findings from Faulkender and Wang (2006) also support the view that when firms experience low levels of internal funding and resort to external markets to raise cash to seize value-enhancing investment opportunities, their cash has a marginal value higher than $1, depending on the transaction costs occurring in the capital markets (Faulkender and Wang 2006). In a similar vein, Denis and Sibilkov (2010) demonstrate that cash is expensive for financially constrained firms so that positive NPV investment are not bypassed, suggesting the marginal value of an investment is greater for constrained firms.

On the other hand, firms with free cash can have a low value because of the agency costs arising from the separation between ownership and control rights (Jensen 1986). According to Jensen (1986), managers are likely to pursue their own interest, i.e., engaging in excessive investments to build their empires, if there is a large volume of free cash under their control, decreasing the value of cash to shareholders. This theoretical prediction has been confirmed by Hardford (1999), who concludes that firms with high levels of cash are more likely to engage in value-decreasing acquisitions than their counterparts, by showing evidence that cash-rich bidders lose seven cents in value for each additional dollar of cash holding. Opler et al. (1999) also find

that companies with excess cash display higher capital expenditure levels and tend to spend more on acquisitions, even when they do not have good investment opportunities. In another work, Richardson (2006) finds consistent evidence that firms who over-commit investments are firms with the highest levels of free cash flow and that the presence of active shareholders can mitigate such over-investment. Inspired by the monitoring function of corporate governance in preventing management from committing free cash to low value investments, Harford et al. (2008) and Dittmar and Smith (2007) study the effects of corporate governance on the use and the value of firm cash. Specifically, Harford et al. (2008) find that, for a group of firms with high level of cash, those with weaker governance spend cash more quickly on M&As and capital expenditures than those with stronger governance, and such over-spending often reduces firm value. Similarly, Dittmar and Smith (2007) show that the value of cash is positively associated with corporate governance and that good governance can double the value of cash compared to a poor governance situation.

Keeping a large volume of free cash in a firm can be a risk because management would engage in excessive value-decreasing investments leading to low value of cash as discussed above. Faulkender and Wang (2006) also argue that the marginal value of cash can also decline if firms with free cash flow distribute the funds to shareholders or use the funds to settle debt rather than invest in value-increasing projects.[3] Therefore, it is critical for shareholders to balance the over-investment and under-investment tradeoff in order to maximize the value of cash by providing sufficient internal capital for management to fund positive NPV projects, while not freely providing capital to allow management to over-invest (Harford et al. 2008).

[3] According to Faulkender and Wang (2006), dividends to shareholders decrease the value of free cash and using cash to settle liabilities increase debt value but not equity value; therefore, the stock market does not assign a high value on one dollar change in cash in these cases.

CHAPTER 3 HYPOTHESES DEVELOPMENT

Investment decision making and implementation signal a CEO's managerial ability for two reasons. First, less able CEOs can under-invest or over-invest because of their careers and reputation concerns. They may be eager to inform investors about their ability through investments that are observable to investors, thereby resulting in over-investment and even value-decreasing investments (Stein 2003). Second, less able CEOs may ignore their own private information about payoffs and copy the decisions of previous managers because they are afraid that their investment decisions may result in punishment from shareholders and markets (Scharfstein and Stein 1990). In contrast, putting their reputation at stake, more able CEOs are likely to consider more seriously about each investment decision they are going to make. Therefore, CEO managerial ability is likely tied to the quality and efficiency of investment decisions in corporate investment context.

Demejian et al. (2012) suggest that a CEO's ability to operate a firm can be reflected by his/her efficiency of revenue generation by consuming fewer resources than his/her peers in the same industry. Such efficiency indicates a manager's ability to create, manage, and enhance the value of the firm, increasing the firm's productivity. A firm's productivity is a critical aspect to maximize shareholder value because shareholder value becomes greater as more output is produced with fewer inputs (Copeland et al. 1994). Investments, including M&A and other types of capital investments, are important corporate activities that support a firm's productivity and continuous growth. Investment activities share the same objective as other corporate activities: to

maximize firm value. According to Copeland et al. (1994), a qualified CEO usually possesses a value-oriented view of investment activities that match the business strategy well and responds to investment opportunities that can create incremental value to the firm, either through potential internal and/or external growth. As such, I conjecture that CEOs with higher ability, indicated by their efficiency of operating a firm, make higher quality and more efficient investment decisions.

M&A are the investment opportunities to support external growth and eventually to realize internal growth. Successful M&A activities are typically rooted in a strong and efficient firm, and they are able to advance the strategic vision and support operating efficiency (Weston and Weaver 2001). In this process, a development of a strategic vision and accurate and sufficient valuation work are crucial. I expect both of the strategic vision development and the valuation work is dependent on CEOs' managerial ability and efficiency for the following reasons. First, high quality CEOs are good at anticipating future changes in their firms' underlying economy (Trueman 1986). They generate strategic plans for firms by assessing the dynamic characteristics of the industry, surrounding competitive environment, and the sufficiency of financial, technological, and managerial support to attain and maintain a competitive dominance (Copeland et al. 1994; Weston and Weaver 2001). Second, CEOs play a key role in estimating the accurate value of existing businesses and potential targets because of their private information, their unique knowledge about business operations, and the ability to foresee future prospects. The evaluation of existing businesses, including interpreting core business and industry structure, capitalizing on economies of scale, and exploiting technology or skills transfers, and the estimation of present values of potential investments are essential to the success of M&A (Copeland et al. 1994). Such evaluation and estimation techniques require a CEO's knowledge of his/her firm's cost structure and revenue drivers (Goodman et al. 2013). If

a CEO manages his/her firm efficiently, it is very likely that he/she understands and analyzes the cost and revenue drivers of the firm very well, enabling him/her to arrive at an accurate estimate of the value of the M&A. Such skill and knowledge also help a high ability CEO identify the right type of synergies, i.e. revenue improvement synergies and/or cost saving synergies, which best supports the whole firm's operation efficiencies.

Based on these discussions, I predict that the M&A conducted by more able CEOs have more favorable outcomes than those conducted by less able CEOs. Specifically, I expect that stock market will react more favorably to the M&A announcements for firms with higher ability CEOs, and that M&As initiated by higher ability CEOs have better post-acquisition performance in terms of changes in operating performance and the likelihood of goodwill impairment and divestiture. Therefore, I posit the following hypotheses in the alternate forms:

H1: More able CEOs are more likely to make higher quality M&A decisions than less able CEOs.
H1a: Stock market reaction to M&A announcements for firms with more able CEOs is more positive than that for firms with less able CEOs.

H1b: M&A conducted by more able CEOs have better post-acquisition performance compared to those conducted by less able CEOs.

Capital investment is necessary to promote internal growth for firms. Typical capital investments, such as capital expenditures and R&D are expected to support the growth of cutting-edge knowledge, products, and technology so that firms can maintain their competitive advantage. Capital investments are central to the value creation and value maximization of firms (Copeland et al. 1994). Capital expenditures and R&D are mainly related to existing operations. Hence, a CEO's ability to make investment decisions may be significantly influenced by his/her efficiency of operating the firm and the knowledge of the key drivers for future growth. In addition, similar to M&A, investment decisions on capital expenditures and R&D require a

vision of future changes and accurate valuation work. The higher ability to foresee and estimate the future payoffs from the new assets and research inputs, the more efficient investment decisions would be made (Goodman et al. 2013). Furthermore, choosing the correct hurdle rate is also important because either a too high or too low hurdle rate can prevent a company from adopting efficient investment policies. Copeland et al. (1994) believe that CEOs who have high productivity determine an appropriate hurdle rate by focusing on the information from the specific business segment levels instead of a company-wide rate. Therefore, I develop the following hypothesis in the alternate form:

H2: More able CEOs make more efficient decisions on capital investments than less able CEOs.

A dollar of cash held by a firm can be valued at more than a dollar by its shareholder, depending on both firm-level and individual-level factors. For example, the cash in financially constrained firms tends to be valued more because its availability greatly impacts whether firms can pursue favorable investment opportunities (e.g., Myers and Majluf 1984; Fazzari et al. 1988; Faulkender and Wang 2006; Denis and Sibilkov 2010). Corporate governance is also shown to have an influence on the value of cash. According to Dittmar and Smith (2007) and Harford et al. (2008), a strong corporate governance mechanism can effectively enhance the value of cash. Aside from firm-level factors discussed above, the value of cash can be affected by individual-level factors. Cash is the internal capital under the CEOs' control. CEOs have discretion to determine the use of cash (Liu and Mauer 2011). Jensen (1986) believes that with available cash in control, CEO individual factors, such as CEOs' personal interests and incentives, affect how the cash will be utilized. Sometimes the cash may not be used to maximize firm value (Jensen 1986).

I argue that the value of cash can vary across different levels of CEO managerial ability. In other words, shareholders can attach higher value to cash if they believe the CEO has higher ability to manage the cash well. More able CEOs are likely to use the available cash in better ways and create greater value from its use, i.e., by making better capital investment decisions. Therefore, I propose the following hypothesis in an alternative form:

> ***H3: The value of cash is higher for firms with the more able CEOs compared to the less able CEOs.***

CHAPTER 4 RESEARCH DESIGN

4.1 Sample and data

The sample period of this study is from 1993 to 2011. Financial data are collected from the COMPUSTAT database; stock returns data are from the CRSP database and the Fama and French 25 portfolios (Fama and French 1993); and corporate governance and CEO compensation data are from the Risk Metrics database and the EXECUCOMP database, respectively. Managerial ability data are constructed according to the methodology described in Demerjian et al. (2012). The acquisition sample is collected from the Securities Data Corporation's (SDC) US Mergers and Acquisitions database. Particularly, for the M&A analyses, certain criteria will be imposed to the M&A sample as in prior studies (e.g., Francis and Martin 2009; Goodman et al. 2013). I only include the M&A transactions in which the acquiring firms are US public companies and their financial and stock return data are available from the COMPUSTAT and the CRSP databases. The number of observations varies depending on the specific dependent variables in the regressions. Finally, firms in the financial services industries (with SIC codes between 6000 and 6999) are excluded from the samples investigated in this study.

4.2 Empirical models

I use multivariate regression models to examine the association between managerial ability and M&A quality, capital investment efficiency, and the value of cash. In the next section, I discuss the dependent and independent variables.

4.2.1 Dependent variables

For the M&A analysis, as in Goodman et al. (2013), I measure M&A quality through an *ex ante* estimate, the market reactions to M&A announcements (3-day abnormal stock return around M&A announcement, *CAR*), and three other *ex post* performance proxies, including post-acquisition change in operating performance (*CHG_CF* and *CHG_ROA*), the likelihood and the magnitude of goodwill impairment in post-acquisition periods (*GOODWILL_DUM* and *GOODWILL*), and post-acquisition probability of divestiture (*DIVESTITURE*).

For the capital investment analysis, the dependent variables are the total capital investment (INVT_TOT) and its major components, including capital expenditure (*CAPX*), R&D expenditure (*R&D*), and acquisition expenditure (*ACQ*). In addition to the actual investment levels, I also look at the abnormal capital investment, which is the difference between actual investment and expected investment (McNichols and Stubben 2008; Biddle et al. 2009).

Furthermore, by including the variable managerial ability in the regression model adopted in Faulkender and Wang (2006), I investigate the association between managerial ability and the value of cash. I measure the value of cash as the stock return resulting from a one dollar change in cash, and I measure the impact of managerial ability on the value of cash as the interaction between managerial ability and the dollar change in cash.

4.2.2 Independent Variables

There are two measures for managerial ability in my study: managerial ability score and managerial ability ranking. Both managerial ability measures are constructed through the methodology developed in Demerjian et al. (2012). Assuming that more able CEOs are capable of generating higher levels of revenue from equivalent levels of inputs, Demerjian et al. (2012) introduced a more comprehensive measure of managerial ability which reflects CEOs'

efficiencies in managing firms and producing revenue. Specifically, in the execution stage, data envelopment analysis (DEA, hereafter) statistic procedure is applied to generate firm efficiency scores, with the underlying rationale of maximizing the output, the revenue, while minimizing the inputs, including the cost of inventory, general and administrative expenses, operating leases, R&D, fixed assets, and intangible assets (Demerjian et al. 2012). The DEA procedure is conducted every year for each industry. According to Demerjian et al. (2012), all firm efficiency scores are deflated by the highest efficiency score within a certain group to construct an ordinal scale in terms of relative efficiency. Firm efficiency scores generated in this way are then used as the dependent variable in the second step to separate managerial factors from firm characteristics.[4] The managerial ability scores are the residuals in the regression of total firm efficiency on certain observable firm-specific characteristics such as firm size, market share, firm age, free cash flow, among others. The ability ranking is then constructed based on ability scores (the residuals) such that values are non-negative. Specially, for M&A analyses, I use 3-year average CEO managerial ability scores (*ABILITY_SCORE_AVG*) and 3-year average CEO managerial ability rankings (*ABILITY_RANKING_AVG*) to indicate CEO average managerial ability before M&A activities.[5]

[4] This second step regression is estimated by industry and year fixed effects are included, as described in Demerjian et al. (2012).

[5] I also use the ability scores and rankings in the last period and their averages in the last 5 years prior to M&A. When using previous year's managerial ability measures, the results (untabulated) are qualitatively similar for the 3-day stock returns, change in ROA, and divestiture. However, the negative effect of managerial ability on change in operating cash flows no longer exists. Managerial ability score is not significantly associated with the likelihood of goodwill impairment, but is significantly and negatively associated with goodwill impairment magnitude. When using previous 5-year average measures of managerial ability, the results (untabulated) on the 3-day cumulative return, post-acquisition operating performance, and possibility of divestiture are similar to those with precious 3-year's managerial ability measures. Although I do not find significant associations between managerial ability score and the likelihood and the magnitude of goodwill impairment, I find a significant and negative association between managerial ability ranking and the likelihood of goodwill impairment.

4.2.3 Models testing managerial ability and M&A quality

H1 predicts that higher ability CEOs are more likely to make higher quality M&A decisions. I estimate Model (1) to examine this hypothesis. Specifically, for the dependent variables of 3-day cumulative stock returns, changes in operating performance, and the magnitude of goodwill impairment, I use OLS regressions. For the dependent variables of likelihood of impairment and divestiture, I use logistic regressions. I control for year and industry effects in the model. Standard errors are clustered at the firm and fiscal year levels.

$$\begin{aligned} M\&A\_QUALITY = {} & \beta_0 + \beta_1 ABILITY\_AVG + \beta_2 SIZE_{t-1} + \beta_3 TOBINQ_{t-1} + \beta_4 ROA_{t-1} \\ & + \beta_5 GROWTH_{t-1} + \beta_6 FCF_{t-1} + \beta_7 LEVERAGE_{t-1} + \beta_8 PRE\_RET_{m-13,m-1} \\ & + \beta_9 CASH\_DEAL_t + \beta_{10} STOCK\_DEAL_t + \beta_{11} PUBLIC_t \\ & + \beta_{12} DOMESTIC_t + \beta_{13} \text{RELATIVE\_SIZE}_t + \beta_{14} BIDDERS_t \\ & + \beta_{15} DIVERSIFYING_t + \beta_{16} E\_INDEX_t + \beta_{17} CEO\_CHAIR_{t-1} \\ & + \beta_{18} EQUITY\_COMP_{t-1} + YEAR\ DUMMIES \\ & + INDUSTRY\ DUMMIES + e_t, \end{aligned} \quad (1)$$

where *MA_QUALITY* = abnormal stock return around M&A announcement (*CAR*), or post-acquisition change in performance (*CHG_CF* or *CHG_ROA*), or likelihood of goodwill impairment (*GOODWILL_DUM*), or magnitude of goodwill impairment (*GOODWILL*), or the probability of divestiture (*DIVESTITURE*); *ABILITY_AVG* = three-year average CEO managerial ability scores (*ABILITY_SCORE_AVG*) or CEO managerial ability rankings (*ABILITY_RANKING_AVG*) before a M&A activity; *SIZE* = natural log of total assets; *TOBINQ* = (market value of equity + the book value of short and long term debt) / total assets; *ROA* = net income before extraordinary items and discontinued operations, scaled by lagged total assets; *GROWTH* = percentage change in sales in a fiscal year; *FCF* = free cash flow, equaling

operating income before depreciation – interest expenses – income taxes – capital expenditures, deflated by lagged total assets; *LEVERAGE* = the ratio of total liabilities to total assets; *PRE_RET* = stock return (buy and hold) over a 12-month period starting from 13 months before the acquisition announcement; *CASH_DEAL* = an indicator variable equal to 1 if it is a purely cash deal, and 0 otherwise; *STOCK_RDEAL* = an indicator variable equal to 1 if it is a purely stock deal, and 0 otherwise; *PUBLIC* = an indicator variable equal to 1 if the target is publicly traded, and 0 otherwise; *DOMESTIC* = an indicator variable equal to 1 if the target is a not a U.S. company, and 0 otherwise; *RELATIVE_SIZE* = the deal value scaled by the acquirer's market value; *BIDDERS* = an indicator variable equal to 1 if there is more than one bidder for the target firm, and 0 otherwise; *DIVERSIFYING* = an indicator variable equal to 1 if the target and the acquirer have different 2-digit SIC codes, and 0 otherwise; *E_INDEX* = management entrenchment index, constructed according to Bebchuk et al. (2009), with a higher index level indicating stronger management entrenchment; *CEO_CHAIR* = an indicator variable equal to 1 if the CEO is also the chair of the board, and 0 otherwise; and *EQUITY_COMP* = the percentage of equity compensation to total compensation; equity compensation is a sum of options and stocks.

I predict that the dependent variable, *M&A_QUALITY,* is positively associated with the proxies for managerial ability. Thus, the coefficient on *ABILITY* is expected to be positive. All variable definitions are shown in Appendix A.

Following prior research on M&As, I use cumulative abnormal stock return around M&A announcements as an *ex ante* proxy for the quality of M&A decisions. Assuming that the market is efficient, announcement returns can be an unbiased estimate reflecting the market participants' perception of whether a M&A event is value-increasing (e.g., Halpern 1983; Jensen and Ruback 1983; Lehn and Zhao 2006; Masulis et al. 2007; Francis and Martin 2010; Goodman et al. 2013).

The 3-day, [-1, +1], cumulative abnormal returns (*CAR*) over M&A announcements are measured using the market model (Model 2 below).

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_t, \quad (2)$$

where R_{it} = stock return for firm *i* over the 200-day period from event day (M&A announcement day) –210 to event day –11; and R_{mt} = CRSP equal-weighted return over the 200-day period from event day –210 to event day –11.

The coefficients estimated from Model *(2)* are then used to obtain abnormal returns with the following model (Model *3*):

$$CAR = R_{it} - \tilde{\alpha}_i - \tilde{\beta}_i R_{mt}, \quad (3)$$

where R_{it} = stock return for firm *i* over the 3-day period from event day –1 to event day +1; and R_{mt} = CRSP equal-weighted return over the 3-day period from event day –1 to event day +1.

Unlike the above abnormal stock return proxy, the other three proxies are *ex post* estimates. Using the post-acquisition change in operating performance can shed light on whether M&A decisions have positive effects on corporate performance in the following years. As in Francis et al. (2010) and Goodman et al. (2013), I look at the post-acquisition change in return on assets (*CHG_ROA*) and in operating cash flow (*CHG_CF*). Cash flow will be deflated by total assets so that this measure is comparable across firms. More specifically, the average returns on assets/cash flows from operations in the 3 years following the acquisition completion will be compared to the average pre-acquisition returns on assets/cash flow from operations in the 3 years before the acquisition, and a difference measure will be derived.[6]

Goodwill is one outcome of M&A activities, representing rents expected from an acquisition and to some extent relying on firms' future management and strategy implementation

[6] As in Francis et al. (2010) and Goodman et al. (2013), I require acquiring companies to have at least 1 year of return on assets data and 1 year of cash flow data in the 3 year periods before and after an acquisition, respectively.

(Ramanna and Watts 2010). Goodwill reflects the quality of M&A where goodwill was generated. Therefore, goodwill impairment signals a misevaluation, thus lower quality of M&A activities (Doellman and Ryngaert 2010; Li et al. 2010; Gu and Lev 2011). Particularly, Gu and Lev (2011) find that the magnitude of share overpricing of the acquiring firm is consistently and positively associated with the extent of goodwill those acquiring firms recognized. Gu and Lev (2011) also state that acquisitions by overpriced companies are often overpaid and strategic misfits, and a later goodwill write-off is an important event highlighting a dysfunctional investment strategy (Gu and Lev 2011). Another work, Li et al. (2010), also reveals that the over-payment to targets can predict subsequent goodwill impairment. Consistent with Goodman et al. (2013), I examine both the likelihood (*GOODWILL_DUM*) and the magnitude of goodwill impairment (*GOODWILL*) in the three years after M&A. I expect that M&A conducted by more able CEOs are less likely to document goodwill impairment in the post-acquisition periods; if they are impaired, the magnitude of goodwill impairment is smaller.

The last proxy for M&A quality is the possibility of divestitures (*DIVESTITURE*) after firms engaged in M&A. Prior literature posits that post-acquisition divestitures usually suggest poor acquisition strategies (Mitchell and Lehn 1990; Kaplan and Weisbach 1992). Two later works, Francis and Martin (2010) and Goodman et al. (2013), adopt the possibility of divestitures as one of the measures for the success of M&A activities to investigate how corporate accounting and disclosure practices impact the M&A quality.[7] Divestitures and goodwill impairment together address the issue of failures in prior M&A activities in a more comprehensive way because a firm might just divest a poor acquisition instead of holding the acquired firm and recognizing goodwill impairment (Goodman et al. 2013). I expect that M&A

[7] Francis and Martin (2010) show that firms adopt more conservative accounting practice are less likely to experience divestiture. Goodman et al. (2013) reveal that firms have better management forecast quality have smaller likelihood of subsequent divestures after they conducted M&A.

conducted by more able CEOs are less likely to experience divestitures in the subsequent years. *DIVESTITURE* is an indicator variable taking the value of 1 if an acquisition results in a subsequent divestiture, and 0 otherwise. A circumstance of divestiture is defined if the target acquired at the acquisition date has the same 4-digit SIC code as the divested unit over a 5-year post-acquisition period.

As indicated by the prior literature (e.g., Masulis et al. 2007; Goodman et al. 2013), I control three sets of variables in the M&A analyses: firm financial characteristics, deal characteristics, and corporate governance and CEO compensation characteristics. In terms of financial characteristics, I control for firm size (*SIZE*), Tobin's Q (*TOBINQ*), return on assets (*ROA*), sales growth (*GROWTH*), free cash flow (*FCF*), leverage (*LEV*), and pre-acquisition stock return (*PRE_RET*). Moeller et al. (2004) show evidence that the size of an acquiring firm is negatively related to the acquiring firms' announcement-period cumulative abnormal return, indicating that, on average, larger acquiring firms make over-valued acquisitions that generate negative benefits. This finding is consistent with the managerial hubris hypothesis in Roll (1986), who claims that managers of large firms are very likely to commit M&A due to hubris. Tobin's Q, the return on assets, and sales growth indicate firms' growth opportunities and can affect M&A decision-making (Moeller et al. 2004; Dong et al. 2006). Prior research on the relation between Tobin's Q and stock market performance around M&A announcement is mixed: Lang et al. (1991) and Servaes (1991) find that Tobin's Q is positively associated with the stock market reaction to the announcements of tender offer acquisitions and public firms acquisitions, while Moeller et al. (2004) show an opposite finding in which there is a negative association between Tobin's Q and the market performance around announcements. Free cash flow and leverage are controlled because the level of free cash can indicate agency conflicts between

managers and shareholders, and the level of leverage suggests the possible strength of monitoring effects from debtors, which can prevent value-reducing investment decisions to some extent (Jensen 1986). The free cash flow hypothesis in Jensen (1986) proposes that free cash flows grants managers more available resources to pursue excessive investments which can harm shareholder interest. Leverage potentially limits managerial discretion regarding over-investment because of increasing monitoring from creditors (e.g., Jensen 1986; Masulis et al. 2007). Empirical evidence from Maloney et al. (1993) also documents a positive relation between the leverage of acquiring firms and the abnormal return around M&A announcements. Rosen (2006) documents that the broad market condition has an impact on the market's response to M&A announcements. Specifically, the market tends to continue to react favorably to M&A announcements if it has been doing that for some time, and M&A announced during hot stock markets are inclined to experience a more positive market reaction than those announced during cold periods (Rosen 2006). Hence, in order to isolate the overall market condition effect, I control for the acquiring firm' pre-acquisition stock returns.

In addition to financial characteristics, I also control for certain deal characteristics that can potentially indicate or impact the quality of M&A according to prior literature: payment methods (*CASH_DEAL* and *STOCK_DEAL*), whether the target is publicly traded or not (*PUBLIC*), the country of the target (*DOMESTIC*), the relative deal size (*RELATIVE_SIZE*), number of bidders (*BIDDERS*), and whether the acquisition is a diversifying one (*DIVERSIFYING*). Both Travlos (1987) and Wansley et al. (1987) find negative abnormal returns to M&A deals financed through new stocks and no abnormal returns for those financed with cash. In later work, Chang (1998) demonstrates that whether the market reacts more positively to stock payment or cash payment depends on whether the targets are publicly traded

or not. When the targets are privately held rather than publicly traded, bidders issuing common stocks to finance acquisitions experience a positive abnormal return, while those offering cash have a zero abnormal return. In a similar vein, Fuller et al. (2002) show that bidders acquiring private targets experience significantly favorable returns compared to those purchasing publicly traded targets. A further investigation on the interaction effect between payment types and public status of target firms by Fuller et al. (2002) finds that acquisitions of public targets bring insignificant market returns to bidders if cash or combination payments were used, but bring significantly negative returns if stock payments were used. As well, the acquisitions of private or subsidiary targets bring significantly positive returns to acquiring firms, regardless of methods of payments (Fuller et al. 2002). Chang (1998) and Fuller et al. (2002) attribute their findings to the liquidation effect and blockholder effect. The lack of liquidity of private or subsidiary firms makes those investments less attractive, thus acquiring firms can capture this discount through investing in privately held firms or subsidiaries. Meanwhile, the likelihood of forming a concentrated ownership in private targets is higher, especially as the relative size increases, and the existence of a large blockholder can exert greater monitoring effect on the bidder's management, resulting in increased bidder value. Such effects are most significant when the target is private and paid with full equity (Martin 1996; Chang 1998; Fuller et al. 2002).

Prior research has shown that conducting diversifying investment actually indicates managers' ambitions in building empires, and that such investment decisions are usually value-destroying and associated with lower announcement period returns (Morck et al. 1990). Therefore, I control whether an acquisition is diversifying (*DIVERSIFYING*). I also control the relative size of the target to the acquiring firm (*RELATIVE_SIZE*) because there is an identified positive association between abnormal returns and the size of a deal (e.g., Asquith et al. 1983;

Moeller et al. 2004). It has been shown that as more competitors compete for the same target, the price paid by the acquiring firm will be higher and the returns to such M&A tend to be lower (Moeller et al. 2004). Therefore, I control for the number of bidders in M&A transactions (*BIDDERS*). Finally, following Moeller et al. (2004) and Goodman et al. (2013), I control the target location−whether the target is located in the U.S. or not (*DOMESTIC*).

Prior studies on M&A have found that corporate governance and CEO compensation characteristics of the acquiring firms can influence corporate investment practices. Prior studies address that managers who are entrenched or have great managerial power are more likely to conduct excessive and value-destroying investments including M&A (e.g., Masulis et al. 2007; Fahlenbrach 2009). Thus I construct the E-index (*E_INDEX*) as in Bebchuk et al. (2009) to control for management entrenchment. I also control CEO/Chairman duality (*CEO_CHAIR*) because it indicates the power of a CEO and his influence on the board to execute his decisions. Grinstein and Hribar (2004) and Masulis et al. (2007) both provide evidence that acquiring firms that combine the positions of CEO and the chairman of the board have lower abnormal announcement returns. Certain characteristics of CEO compensation are also shown to affect CEOs' decisions on corporate investments. Particularly, Datta et al. (2001) finds positive stock market performance around and subsequent to acquisition announcements to acquiring firms whose managers receive more intensive equity-based compensation. Therefore, I control for the percentage of CEO equity-based compensation to CEO total compensation (*EQUITY_COMP*) in the regression.

4.2.4 Models testing managerial ability and capital investment efficiency

Over- or under-investment can occur due to agency problems such as moral hazard and adverse selection (e.g., Jensen and Merkling 1976; Myers and Majluf 1984; Jensen 1986;

Lambert et al. 2007; Biddle et al. 2009). I investigate whether high managerial ability is able to improve capital investment efficiency when firms are more vulnerable to agency problems, i.e., to decrease (increase) investment when it has a tendency of over-investing (under-investing). Consistent with the practice in Biddle et al. (2009), I divide the firms into two categories: a more likely to over-invest group and a more likely to under-invest group using cash and leverage as criteria. The underlying rationale for using these two criteria is that the level of free cash flow and leverage may indicate agency problems (e.g., Jensen 1986; Myers and Majluf 1984). I first estimate the following OLS regression Model (4) to test the association between managerial ability and capital investment levels (or abnormal capital investment levels). I then incorporate the variable *OVERI*, which indicates the likelihood of over-investment, and the interaction between *OVERI* and managerial ability in Model (4) to test my research question (Model 5). I control for industry fixed effects and year fixed effects in the model. Standard errors are clustered at the firm and fiscal year levels.

$$\begin{aligned} INVT_{i,t+1}\ (or\ AB\_INVT_{i,t+1}) = {} & \beta_0 + \beta_1 ABILITY_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 MTOB_{i,t} + \beta_4 LOSS_{i,t} \\ & + \beta_5 SALE\_VOL_{i,t} + \beta_6 INVT\_VOL_{i,t} + \beta_7 CFO\_SALE_{i,t} \\ & + \beta_8 CFO\_VOL_{i,t} + \beta_9 SLACK_{i,t} + \beta_{10} DIV_{i,t} + \beta_{11} ZSCORE_{i,t} \\ & + \beta_{12} TANGIBILITY_{i,t} + \beta_{13} KSTRUCTURE_{i,t} \\ & + \beta_{14} IND\_KSTRUCTURE_{i,t} + INDUSTRY\ DUMMIES \\ & + YEAR\ DUMMIES + e_{i,t+1}, \end{aligned} \quad (4)$$

$$\begin{aligned} INVT_{i,t+1}\ (or\ AB\_INVT_{i,t+1}) = {} & \beta_0 + \beta_1 ABILITY_{i,t} + \beta_2 OVERI_{i,t+1} + \beta_3 OVERI_{i,t+1} * ABILITY_{i,t} \\ & + \beta_4 SIZE_{i,t} + \beta_5 MTOB_{i,t} + \beta_6 LOSS_{i,t} + \beta_7 SALE\_VOL_{i,t} \\ & + \beta_8 INVT\_VOL_{i,t} + \beta_9 CFO\_SALE_{i,t} + \beta_{10} CFO\_VOL_{i,t} \end{aligned}$$

$$+ \beta_{11} SLACK_{i,t} + \beta_{12} DIV_{i,t} + \beta_{13} ZSCORE_{i,t}$$

$$+ \beta_{14} TANGIBILITY_{i,t} + \beta_{15} KSTRUCTURE_{i,t}$$

$$+ \beta_{16} IND\_KSTRUCTURE_{i,t} + INDUSTRY\ DUMMIES$$

$$+ YEAR\ DUMMIES + e_{i,t+1}, \quad (5)$$

where *INVT*= *INVT_TOT*, the level of total capital investment, equaling to the sum of capital expenditure, R&D expenditure, and acquisition expenditure less cash receipts from the sale of property, plant, and equipment, or *CAPX*, the level of capital expenditure, or *R&D*, the level of R&D expenditure, or *ACQ*, the level of acquisition expenditure; *AB_INVT* = *AB_TOT*, the abnormal level of total capital investment, proxied by the residuals from the regression of a firm's total capital investment on lagged sales growth, or *AB_CAPX*, the abnormal level of capital expenditure, proxied by the residuals from the regression of a firm's capital expenditure on lagged sales growth, or *AB_R&D*, the abnormal level of R&D expenditure, proxied by the residuals from the regression of a firm's R&D expenditure on lagged sales growth, or *AB_ACQ*, the abnormal level of acquisition expenditure, proxied by the residuals from the regression of a firm's acquisition expenditure on lagged sales growth; *ABILITY* = CEO managerial ability scores, *ABILITY_SCORE*; or CEO managerial ability rankings, *ABILITY_RANKING*; *OVERI* = a composite score measure created to indicate the likelihood of over- and under-investment based on the ranking of cash and leverage levels; *SIZE* = natural log of total assets; *MTOB* = the ratio of the market value of total assets to book value of total assets; *LOSS* = an indicator variable equal to 1 if net income before extraordinary items is negative, and 0 otherwise; *SALE_VOL* = standard deviation of the sales scaled by average total assets over previous five years; *INVT_VOL* = standard deviation of investment over previous five years; *CFO_SALE* = operating cash flows divided by sales; *CFO_VOL* = standard deviation of the cash flow from operations

scaled by average total assets over previous five years; *SLACK* = the ratio of cash to PPE; *DIV* = an indicator variable equal to 1 if the firm paid dividends, and 0 otherwise; *ZSCORE* = 0.033*earnings before extraordinary item/total assets + sales/total assets + 0.014*retained earnings/total assets + 0.012*(working capital/total assets) + 0.006*(market value of common stock/total liabilities); *TANGIBILITY* = PPE divided by total assets; *KSTRUCTURE* = long-term debt divided by the sum of long-term debt and the market value of equity; and *IND_KSTRUCTURE* = mean K-structure for firms in the same SIC3-digit industry.

OVERI is a rank variable used to identify tendency towards over-investment or under-investment. As in Biddle et al. (2009), I rank firms into deciles according to their cash and leverage levels. Leverage is multiplied by -1 before ranking so that it can be interpreted the same direction as cash balance. Deciles constructed in this way are re-scaled to range from 0 to 1. I then create a composite score measure (*OVERI*), equaling the mean of the ranked values of the two partitioning variables. The *OVERI* variable is increasing with the trend of over-investment. In Model (5), β_1 indicates the effect of managerial ability on investment level when under-investment is most likely, i.e., when *OVERI* is 0, and β_3 measures the incremental effect of managerial ability on investment levels, and the sum of β_1 and β_3 measures the overall effect of managerial ability on investment when *OVERI* is not 0. If more able CEOs make more efficient investment decisions, I will observe a positive β_1 and a negative β_3.

In addition to the actual level of capital investment, I also look at the association between the abnormal capital investment and managerial ability conditional on the tendency to over- and under-investment. I use the following Model (5) to estimate the abnormal capital investment. Specifically, I conduct industry-year regressions by regressing a firm's total capital investment (or capital expenditure, R&D, and acquisition expenditure, respectively) on lagged sales growth

(Δ*SALE*) (see Model 5 below).[8] The residuals from this regression are considered as the abnormal total capital investment (or the abnormal capital expenditure, abnormal R&D, and the abnormal acquisition expenditure depending on the dependent variables).[9]

$$INVT_{i,t+1} = \beta_0 + \beta_1 \Delta SALE_{i,t} + e_{i,t+1}, \quad (6)$$

Where *INVT* = *INVT_TOT*, the level of total capital investment, equaling to the sum of capital expenditure, R&D expenditure, and acquisition expenditure less cash receipts from the sale of property, plant, and equipment, or *CAPX*, the level of capital expenditure, or *R&D*, the level of R&D expenditure, or *ACQ*, the level of acquisition expenditure; and Δ*SALE* = sales growth.

Following Biddle and Hilary (2006) and Biddle et al. (2009), I include several control variables, such as firm size (*SIZE*), market-to-book ratio (*MTOB*), the return on assets (*ROA*), loss (*LOSS*), sales volatility (*SALE_VOL*), investment volatility (*INVT_VOL*), cash flow to sale ratio (*CFO_SALE*), cash flow volatility (*CFO_VOL*), cash to PPE ratio (*SLACK*), dividend (*DIV*), the possibility of bankruptcy measured as in Altman (1968) (*ZSCORE*), the ratio of PPE to total assets (*TANGIBILIT*), capital structure (*KSTRUCTURE*), and leverage (*IND_STRUCTURE*). Among these variables, sales volatility, return on assets, and loss indicate firm performance and profitability. Both firm size and market-to-book ratio represent growth opportunities, and cash flow to sale ratio, cash flow volatility, cash to PPE ratio, dividend, the possibility of bankruptcy, and capital structure suggest free cash availability, the degree of financial constraint, and the magnitude of agency problems, respectively.

4.2.5 Models testing managerial ability and the value of cash

In order to investigate H3, whether CEO managerial ability is positively related to the value of cash of the firm operated by that CEO, I adopt the method of evaluating the value of

[8] I require at least 20 observations for each year and a certain industry.
[9] In this sense, the more positive (negative) the residuals, the greater magnitude of over-investment (under-investment).

cash developed by Faulkender and Wang (2006) and incorporate managerial ability in it as follows (Model 6). This model regresses excess return on changes in cash while controlling other firm characteristics such as profitability, financial status, and investment practice, with all independent variables scaled by the beginning market value of equity ($M_{i,\,t-1}$). In this way, the coefficient of the interaction between managerial ability and the dollar change in cash, β_{12}, indicates the incremental effect of managerial ability on the value of cash held by the firm and is expected to be positive according to H3.

$$EX\_RET_{i,t} = \beta_0 + \beta_1 \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_2 ABILITY_{i,t} + \beta_3 ABILITY_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_4 \frac{\Delta E_{i,t}}{M_{i,t-1}} + \beta_5 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \beta_6 \frac{\Delta RD_{i,t}}{M_{i,t-1}} +$$

$$\beta_7 \frac{\Delta I_{i,t}}{M_{i,t-1}} + \beta_8 \frac{\Delta D_{i,t}}{M_{i,t-1}} + \beta_9 \frac{C_{i,t-1}}{M_{i,t-1}} + \beta_{10} L_{i,t} + \beta_{11} \frac{NF_{i,t}}{M_{i,t-1}} + \beta_{12} \frac{C_{i,t-1}}{M_{i,t-1}} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \beta_{13} L_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + e_{i,t}, \quad (7)$$

where $EX\_RET_{i\,=}$ a stock's excess return over the fiscal year - stock *i*'s return during fiscal year *t* (computed using monthly returns from CRSP) less the return of stock *i*'s size and book-to-market matched portfolio during fiscal year *t* constructed through the method in Fama and French (1993);[10] ΔC = change in cash and marketable securities; *ABILITY* = CEO managerial ability scores, *ABILITY_SCORE*, or CEO managerial ability rankings, *ABILITY_RANKING*; ΔE = change in earnings before extraordinary items; ΔNA = change in total assets subtract cash; ΔRD = change in R&D (0 if missing); $\Delta\ I$ = change in interest expenses; $\Delta\ D$ = change in common dividends distributed to common stock; *C* = cash and marketable securities; *L* = total debt divided by the sum of the book value of total debt and the market value of equity; *NF* = new finance in year t, including net new equity issues and net new debt issues; and *M* = market value of equity.

[10] The 25 Fama and French portfolios, constructed on size and book-to-market, are value-weighted returns and will be used as benchmark portfolios to calculate a stock's excess return. The returns to these portfolios are available from the website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Further, I incorporate firms' financial constraint status into the examination of the association between managerial ability and the value of cash. Prior studies suggest that firms experiencing financial constraints place a higher value on their cash because the availability of cash determines whether those firms can seize favorable investment opportunities (Myers and Majluf 1984; Fazzari et al. 1988; Faulkender and Wang 2006; Denis and Sibilkov 2010). Using the four criteria proposed by Almeida et al. (2004) and Denis and Sibilkov (2010) to sort firms, I study the pattern of the effect of managerial ability on the value of cash across financially constrained firms and financially unconstrained firms.

The first criterion is the annual payout ratio: dividends and common stock repurchases divided by operating income. For each year, I classify firms in the bottom (top) three deciles of the annual cash payout ratio distribution as the financially constrained (unconstrained) group. The next criterion is firm size. Firms are ranked based on their book value of total assets each year, and the bottom (top) three deciles of the distribution are classified as the financially constrained (unconstrained) group. Debt rating is the third criterion. Firms are considered to be financially unconstrained if they have had their long-term debt rated by Standard & Poor (available in the COMPUSTAT database) and their debts are not in default (a rating of "D" or "SD"); firms are considered constrained if they have debt outstanding that year but have never had their public debt rated before (or the long-term debt rating is unavailable). Firms with no debt outstanding are considered unconstrained. The last criterion is paper rating. Consistent with Denis and Sibilkov (2010), if firms have had their short-term debts rated by S&P's and their debts are not in default, they are labeled financially unconstrained. Conversely, if they have debt outstanding that year, but have never had their short-term debt rated before (or the rating is

unavailable), they are labeled as financially constrained. Similar to the situation of debt ratings, firms with no short-term debt outstanding are treated as financially unconstrained. Model (6) is tested in the financially constrained group and financially unconstrained group, respectively, as classified by the above four criteria.

CHAPTER 5 EMPIRICAL RESULTS

5.1 Managerial ability and M&A quality

After eliminating observations with missing values in the variables of Model (1), sample sizes vary across the four dependent variables in this set of analyses. In Table 1, I present the distribution of M&A sample by the two-digit SIC industry code. The industry with the highest frequency is Industrial Machinery and Computer Equipment (14.69 percent, SIC code 35), followed by Business Services (14.29 percent, SIC code 73), and Instruments and Related Products (12.74 percent, SIC code 38).

Table 1: Distribution of Firm-Year Observations by Industry of M&A sample

	Two-digit SIC	# of Obs.	% of Sample	Cumulative Percent
Metal Mining, Ores	10	26	0.81	0.99
Oil and Gas	13	127	3.94	4.93
Food, Beverage	20	79	2.45	7.38
Textile Mill Products	22	18	0.56	7.94
Apparel and Other Textile Products	23	24	0.74	8.68
Lumber and Wood Products	24	17	0.53	9.21
Furniture and Fixtures	25	25	0.77	9.98
Paper and Allied Products	26	46	1.43	11.41
Printing and Publishing	27	60	1.86	13.27
Chemicals and Allied Products	28	256	7.94	21.21
Petroleum	29	19	0.59	21.8
Rubber	30	26	0.81	22.61
Stone, Clay, & Glass Products	32	21	0.65	23.26
Primary Metal Industries	33	79	2.45	25.71
Fabricated Metal Products	34	59	1.83	27.54
Industrial Machinery and Computer Equipment	35	474	14.69	42.23
Electronic and Other Electric Equipment	36	389	12.06	54.29
Transportation Equipment	37	104	3.22	57.51
Instruments and Related Products	38	411	12.74	70.25
Miscellaneous Manufacturing	39	36	1.12	71.37
Water Transportation	44	17	0.53	71.9
Communication	48	64	1.98	73.88
Wholesale—Durable Goods	50	46	1.43	75.31
Wholesale—Non-Durable Goods	51	14	0.43	75.74
General Merchandise Store	53	23	0.71	76.45
Apparel and Accessory Stores	56	15	0.46	76.91
Eating and Drinking	58	27	0.84	77.75
Miscellaneous Retail	59	14	0.43	78.18
Personal Services	72	16	0.5	78.68
Business Services	73	461	14.29	92.97
Health Services	80	62	1.92	94.89
Social Services	83	14	0.43	95.32
Engineering and Management Services	87	42	1.3	96.62
Other Industries[11]		115	3.38	100.00
Total		3226	100	

[11] Industries whose observations are less than 10 are aggregated into this category.

Descriptive statistics of the M&A sample are tabulated in Table 2, Panels A through D. The 3-day cumulative abnormal return has a mean value of 0.003 and a median of 0.002, the change in ROA has a mean value of -0.022 and a median of -0.012, and the change in cash flow has a mean of -0.020 and a median of -0.013. In the goodwill impairment sample, an average of 30 percent of the M&A experience goodwill impairment, and the average goodwill impairment size is $73.209 million. In the divestiture sample, 38.8 percent of the M&A experience divestiture in the next five years. In terms of the variables of interest and the control variables, by looking at the stock market reaction example, the managerial ability score has a mean of 0.028 and a median of 0.018, and managerial ability ranking has a mean of 0.626 and a median of 0.633. The sample has a mean firm size of 7.758, and an average ROA of 0.072. About 63.6 percent of the M&A are purely cash deals, and 13 percent are purely stock deals. In addition, 26.7 percent of the targets are public trading firms, and 23.8 percent of the targets are foreign firms. Finally, about 55 percent of the CEOs in the sample are also the chair of the board.

Table 2: Descriptive Statistics of the M&A sample

Panel A: Stock market reaction						
	N	Mean	SD	P25	Median	P75
ABILITY_SCORE_AVG	3226	0.028	0.121	-0.049	0.018	0.100
ABILITY_RANKING_AVG	3226	0.626	0.229	0.450	0.633	0.800
CAR	3226	0.003	0.052	-0.020	0.002	0.025
SIZE	3226	7.758	1.527	6.630	7.556	8.751
TOBINQ	3226	2.475	2.029	1.388	1.843	2.664
ROA	3226	0.072	0.114	0.036	0.070	0.110
GROWTH	3226	0.089	0.235	0.019	0.100	0.194
FCF	3226	0.066	0.099	0.031	0.067	0.107
LEVERAGE	3226	0.481	0.197	0.340	0.488	0.599
PRE_RET	3226	0.214	0.567	-0.091	0.138	0.390
CASH_DEAL	3226	0.636	0.481	0.000	1.000	1.000
STOCK_DEAL	3226	0.130	0.336	0.000	0.000	0.000
PUBLIC	3226	0.267	0.442	0.000	0.000	1.000
DOMESTIC	3226	0.238	0.426	0.000	0.000	0.000

RELATIVE_SIZE	3226	0.056	0.105	0.005	0.018	0.060
BIDDERS	3226	0.023	0.151	0.000	0.000	0.000
DIVERSIFYING	3226	0.446	0.497	0.000	0.000	1.000
E_INDEX	3226	2.237	1.390	1.000	2.000	3.000
CEO_CHAIR	3226	0.549	0.498	0.000	1.000	1.000
EQUITY_COMP	3226	0.479	0.297	0.253	0.520	0.717

Panel B: Post-acquisition operating performance

	N	Mean	SD	P25	Median	P75
ABILITY_SCORE_AVG	2898	0.029	0.121	-0.049	0.019	0.103
ABILITY_RANKING_AVG	2898	0.629	0.228	0.450	0.633	0.800
CHG_ROA	2898	-0.022	0.104	-0.053	-0.012	0.016
CHG_CF	2898	-0.020	0.080	-0.050	-0.013	0.020
SIZE	2898	7.769	1.521	6.651	7.582	8.753
TOBINQ	2898	2.536	2.096	1.398	1.869	2.711
ROA	2898	0.073	0.116	0.037	0.072	0.113
GROWTH	2898	0.093	0.228	0.021	0.102	0.195
FCF	2898	0.069	0.096	0.033	0.068	0.109
LEVERAGE	2898	0.481	0.198	0.340	0.489	0.597
PRE_RET	2898	0.223	0.577	-0.084	0.143	0.397
CASH_DEAL	2898	0.633	0.482	0.000	1.000	1.000
STOCK_DEAL	2898	0.133	0.339	0.000	0.000	0.000
PUBLIC	2898	0.263	0.440	0.000	0.000	1.000
DOMESTIC	2898	0.232	0.422	0.000	0.000	0.000
RELATIVE_SIZE	2898	0.055	0.102	0.005	0.018	0.058
BIDDERS	2898	0.016	0.124	0.000	0.000	0.000
DIVERSIFYING	2898	0.449	0.498	0.000	0.000	1.000
E_INDEX	2898	2.237	1.394	1.000	2.000	3.000
CEO_CHAIR	2898	0.545	0.498	0.000	1.000	1.000
EQUITY_COMP	2898	0.484	0.297	0.264	0.524	0.719

Panel C: Goodwill impairment

	N	Mean	SD	P25	Median	P75
ABILITY_SCORE_AVG	730	0.031	0.116	-0.052	0.017	0.107
ABILITY_RANKING_AVG	730	0.629	0.224	0.433	0.633	0.833
GOODWILL_DUM	730	0.300	0.459	0.000	0.000	1.000
GOODWILL	730	73.209	347.427	0.000	0.000	15.000
SIZE	730	7.301	1.312	6.333	7.155	8.022
TOBINQ	730	2.374	1.575	1.449	1.906	2.666
ROA	730	0.075	0.101	0.049	0.077	0.111

GROWTH	730	0.089	0.283	0.040	0.111	0.193
FCF	730	0.084	0.075	0.051	0.077	0.116
LEVERAGE	730	0.453	0.215	0.308	0.450	0.565
PRE_RET	730	0.224	0.585	-0.071	0.157	0.397
CASH_DEAL	730	0.658	0.475	0.000	1.000	1.000
STOCK_DEAL	730	0.045	0.208	0.000	0.000	0.000
PUBLIC	730	0.244	0.430	0.000	0.000	0.000
DOMESTIC	730	0.201	0.401	0.000	0.000	0.000
RELATIVE_SIZE	730	0.087	0.128	0.011	0.041	0.111
BIDDERS	730	0.019	0.137	0.000	0.000	0.000
DIVERSIFYING	730	0.448	0.498	0.000	0.000	1.000
E_INDEX	730	2.370	1.371	1.000	2.000	3.000
CEO_CHAIR	730	0.510	0.500	0.000	1.000	1.000
EQUITY_COMP	730	0.485	0.293	0.250	0.534	0.731

Panel D: Divestiture

	N	Mean	SD	P25	Median	P75
ABILITY_SCORE_AVG	2966	0.028	0.120	-0.049	0.019	0.101
ABILITY_RANKING_AVG	2966	0.627	0.228	0.433	0.633	0.800
DIVEST	2966	0.388	0.487	0.000	0.000	1.000
SIZE	2966	7.756	1.524	6.634	7.561	8.749
TOBINQ	2966	2.522	2.079	1.398	1.858	2.708
ROA	2966	0.072	0.116	0.036	0.071	0.113
GROWTH	2966	0.092	0.227	0.021	0.101	0.195
FCF	2966	0.068	0.097	0.033	0.068	0.109
LEVERAGE	2966	0.479	0.197	0.338	0.487	0.597
PRE_RET	2966	0.222	0.579	-0.088	0.141	0.396
CASH_DEAL	2966	0.633	0.482	0.000	1.000	1.000
STOCK_DEAL	2966	0.131	0.338	0.000	0.000	0.000
PUBLIC	2966	0.261	0.439	0.000	0.000	1.000
DOMESTIC	2966	0.232	0.422	0.000	0.000	0.000
RELATIVE_SIZE	2966	0.055	0.104	0.005	0.018	0.058
BIDDERS	2966	0.016	0.124	0.000	0.000	0.000
DIVERSIFYING	2966	0.449	0.497	0.000	0.000	1.000
E_INDEX	2966	2.236	1.389	1.000	2.000	3.000
CEO_CHAIR	2966	0.548	0.498	0.000	1.000	1.000
EQUITY_COMP	2966	0.483	0.297	0.261	0.525	0.720

All variables are defined in Appendix A.

Table 3 reports the descriptive statistics by low versus high managerial ability, using the industry median of the managerial ability score as a benchmark.[12] According to Panel A of Table 3, both the managerial ability score and the ranking are statistically higher in the high ability group, as indicated by the significant *p*-value from both *t*-tests and Wilcoxon Tests. The 3-day cumulative abnormal return is not statistically different. Turning to the control variables, high ability CEOs are more likely to acquire private companies and use stock to finance M&A. Firms with high ability CEOs have more investment opportunities as indicated by higher Tobin's Q, better firm performance as indicated by ROA, higher growth, more free cash flow, and lower leverage. As well, high ability CEOs are less likely to have dual positions and have higher percentages of equity compensation. In Panel B, ROA and operating cash flows are worse in the post-acquisition period as indicated by the negative means and medians. However, the change in ROA and the change in operating cash flows are even more negative in firms with high ability CEOs. Panel C shows that the likelihood of goodwill impairment is lower and the magnitude of goodwill impairment is smaller for the M&A conducted by high ability CEOs, and Panel D shows that he probability of divesting is lower for the M&As conducted by high ability CEOs.

[12] I mainly discuss the statistics of all variables in Panel A of Table 3 and the statistics of the dependent variables in Panel B, Panel C, and Panel D of Table 3.

Table 3: Descriptive Statistics of M&A sample by Low versus High Managerial Ability

Panel A: Stock market reaction

	Low Ability				High Ability				Difference Tests	
	N	Mean	SD	Median	N	Mean	SD	Median	*t*-test (*p*-value)	Wilcoxon (*p*-value)
ABILITY_SCORE_AVG	1595	-0.065	0.069	-0.049	1631	0.120	0.087	0.099	0.000	0.000
ABILITY_RANKING_AVG	1595	0.439	0.150	0.433	1631	0.809	0.119	0.800	0.000	0.000
CAR	1595	0.003	0.053	0.002	1631	0.003	0.051	0.002	0.903	0.984
SIZE	1595	7.771	1.684	7.465	1631	7.745	1.355	7.620	0.634	0.120
TOBINQ	1595	2.102	1.319	1.696	1631	2.841	2.484	1.981	0.000	0.000
ROA	1595	0.056	0.095	0.058	1631	0.087	0.128	0.086	0.000	0.000
GROWTH	1595	0.069	0.227	0.087	1631	0.109	0.240	0.111	0.000	0.000
FCF	1595	0.051	0.089	0.056	1631	0.081	0.106	0.077	0.000	0.000
LEVERAGE	1595	0.499	0.195	0.501	1631	0.462	0.198	0.475	0.000	0.000
PRE_RET	1595	0.212	0.549	0.131	1631	0.217	0.584	0.144	0.827	0.975
CASH_DEAL	1595	0.638	0.481	1.000	1631	0.635	0.482	1.000	0.829	0.829
STOCK_DEAL	1595	0.108	0.311	0.000	1631	0.151	0.358	0.000	0.000	0.000
PUBLIC	1595	0.288	0.453	0.000	1631	0.245	0.430	0.000	0.006	0.006
DOMESTIC	1595	0.247	0.431	0.000	1631	0.230	0.421	0.000	0.255	0.255
RELATIVE_SIZE	1595	0.062	0.108	0.020	1631	0.051	0.102	0.016	0.003	0.001
BIDDERS	1595	0.023	0.149	0.000	1631	0.024	0.153	0.000	0.801	0.801
DIVERSIFYING	1595	0.432	0.496	0.000	1631	0.459	0.498	0.000	0.120	0.120
E_INDEX	1595	2.255	1.376	2.000	1631	2.219	1.404	2.000	0.466	0.481
CEO_CHAIR	1595	0.581	0.494	1.000	1631	0.518	0.500	1.000	0.000	0.000
EQUITY_COMP	1595	0.458	0.288	0.490	1631	0.500	0.305	0.542	0.000	0.000

Panel B: Post-acquisition operating performance

	Low Ability				High Ability				Difference Tests	
	N	Mean	SD	Median	N	Mean	SD	Median	*t*-test (*p*-value)	Wilcoxon (*p*-value)
ABILITY_SCORE_AVG	1435	-0.064	0.071	-0.049	1463	0.12	0.085	0.101	0.000	0.000
ABILITY_RANKING_AVG	1435	0.444	0.151	0.433	1463	0.809	0.119	0.800	0.000	0.000
CHG_ROA	1435	-0.013	0.086	-0.007	1463	-0.030	0.119	-0.018	0.000	0.000
CHG_CF	1435	-0.009	0.066	-0.007	1463	-0.030	0.091	-0.020	0.000	0.000
SIZE	1435	7.807	1.679	7.536	1463	7.732	1.347	7.610	0.186	0.665
TOBINQ	1435	2.146	1.358	1.722	1463	2.919	2.569	2.013	0.000	0.000
ROA	1435	0.058	0.095	0.060	1463	0.087	0.133	0.088	0.000	0.000
GROWTH	1435	0.071	0.227	0.090	1463	0.114	0.226	0.114	0.000	0.000
FCF	1435	0.054	0.084	0.058	1463	0.085	0.103	0.077	0.000	0.000
LEVERAGE	1435	0.501	0.192	0.504	1463	0.460	0.200	0.473	0.000	0.000
PRE_RET	1435	0.226	0.565	0.141	1463	0.221	0.589	0.146	0.842	0.791
CASH_DEAL	1435	0.630	0.483	1.000	1463	0.636	0.481	1.000	0.750	0.750
STOCK_DEAL	1435	0.114	0.317	0.000	1463	0.152	0.359	0.000	0.003	0.003
PUBLIC	1435	0.287	0.453	0.000	1463	0.239	0.426	0.000	0.003	0.003
DOMESTIC	1435	0.237	0.425	0.000	1463	0.228	0.419	0.000	0.553	0.553
RELATIVE_SIZE	1435	0.060	0.107	0.020	1463	0.049	0.097	0.016	0.004	0.006
BIDDERS	1435	0.014	0.117	0.000	1463	0.017	0.130	0.000	0.493	0.493
DIVERSIFYING	1435	0.432	0.496	0.000	1463	0.466	0.499	0.000	0.065	0.065
E_INDEX	1435	2.274	1.366	2.000	1463	2.200	1.420	2.000	0.155	0.124
CEO_CHAIR	1435	0.582	0.493	1.000	1463	0.508	0.500	1.000	0.000	0.000
EQUITY_COMP	1435	0.463	0.286	0.495	1463	0.504	0.305	0.544	0.000	0.000

Panel C: Goodwill impairment

	Low Ability				High Ability				Difference Tests	
	N	Mean	SD	Median	N	Mean	SD	Median	*t*-test (*p*-value)	Wilcoxon (*p*-value)
ABILITY_SCORE_AVG	355	-0.059	0.061	-0.055	375	0.116	0.089	0.105	0.000	0.000
ABILITY_RANKING_AVG	355	0.454	0.152	0.433	375	0.795	0.138	0.800	0.000	0.000
GOODWILL_DUM	355	0.341	0.475	0.000	375	0.261	0.440	0.000	0.019	0.019
GOODWILL	355	100.077	455.645	0.000	375	47.774	193.483	0.000	0.042	0.014
SIZE	355	7.150	1.310	6.994	375	7.444	1.299	7.395	0.002	0.001
TOBINQ	355	2.275	1.391	1.888	375	2.467	1.729	1.922	0.098	0.337
ROA	355	0.066	0.091	0.070	375	0.084	0.108	0.088	0.015	0.000
GROWTH	355	0.089	0.268	0.106	375	0.088	0.297	0.112	0.975	0.751
FCF	355	0.074	0.067	0.072	375	0.093	0.080	0.085	0.001	0.001
LEVERAGE	355	0.452	0.208	0.441	375	0.454	0.222	0.451	0.916	0.984
PRE_RET	355	0.239	0.570	0.150	375	0.211	0.599	0.165	0.515	0.675
CASH_DEAL	355	0.617	0.487	1.000	375	0.696	0.461	1.000	0.024	0.025
STOCK_DEAL	355	0.051	0.220	0.000	375	0.040	0.196	0.000	0.487	0.487
PUBLIC	355	0.254	0.436	0.000	375	0.235	0.424	0.000	0.554	0.554
DOMESTIC	355	0.189	0.392	0.000	375	0.213	0.410	0.000	0.408	0.408
RELATIVE_SIZE	355	0.095	0.127	0.050	375	0.080	0.129	0.034	0.113	0.031
BIDDERS	355	0.014	0.118	0.000	375	0.024	0.153	0.000	0.330	0.329
DIVERSIFYING	355	0.406	0.492	0.000	375	0.488	0.501	0.000	0.025	0.025
E_INDEX	355	2.375	1.344	3.000	375	2.365	1.398	2.000	0.927	0.843
CEO_CHAIR	355	0.566	0.496	1.000	375	0.456	0.499	0.000	0.003	0.003
EQUITY_COMP	355	0.445	0.300	0.481	375	0.524	0.280	0.557	0.000	0.000

Panel D: Divestiture

	Low Ability				High Ability				Difference Tests	
	N	Mean	SD	Median	N	Mean	SD	Median	*t*-test (*p*-value)	Wilcoxon (*p*-value)
ABILITY_SCORE_AVG	1471	-0.065	0.070	-0.049	1495	0.119	0.085	0.100	0.000	0.000
ABILITY_RANKING_AVG	1471	0.441	0.150	0.433	1495	0.809	0.119	0.800	0.000	0.000
DIVEST	1471	0.428	0.495	0.000	1495	0.349	0.477	0.000	0.000	0.000
SIZE	1471	7.772	1.675	7.468	1495	7.741	1.359	7.613	0.587	0.209
TOBINQ	1471	2.130	1.344	1.713	1495	2.908	2.549	2.013	0.000	0.000
ROA	1471	0.056	0.098	0.059	1495	0.088	0.130	0.088	0.000	0.000
GROWTH	1471	0.069	0.233	0.090	1495	0.114	0.219	0.112	0.000	0.000
FCF	1471	0.052	0.088	0.057	1495	0.085	0.102	0.077	0.000	0.000
LEVERAGE	1471	0.498	0.193	0.500	1495	0.461	0.200	0.474	0.000	0.000
PRE_RET	1471	0.226	0.574	0.135	1495	0.218	0.585	0.147	0.690	0.901
CASH_DEAL	1471	0.634	0.482	1.000	1495	0.632	0.482	1.000	0.934	0.934
STOCK_DEAL	1471	0.111	0.315	0.000	1495	0.151	0.358	0.000	0.001	0.001
PUBLIC	1471	0.283	0.451	0.000	1495	0.238	0.426	0.000	0.005	0.005
DOMESTIC	1471	0.236	0.425	0.000	1495	0.228	0.420	0.000	0.615	0.615
RELATIVE_SIZE	1471	0.061	0.108	0.020	1495	0.05	0.099	0.016	0.004	0.002
BIDDERS	1471	0.014	0.116	0.000	1495	0.017	0.131	0.000	0.403	0.403
DIVERSIFYING	1471	0.434	0.496	0.000	1495	0.464	0.499	0.000	0.111	0.110
E_INDEX	1471	2.262	1.361	2.000	1495	2.21	1.417	2.000	0.305	0.254
CEO_CHAIR	1471	0.580	0.494	1.000	1495	0.516	0.500	1.000	0.000	0.000
EQUITY_COMP	1471	0.464	0.287	0.503	1495	0.502	0.305	0.546	0.000	0.000

All variables are defined in Appendix A.

Table 4 shows the Spearman correlations among selected variables of the M&A analyses. Panel A of Table 4 presents the Spearman correlations among all variables in the stock market reaction model, and Panel B−D of Table 4 display the Spearman correlations between the two variables of interests, managerial ability score and ability ranking, and the dependent variables in the post-acquisition operating performance model, goodwill impairment, and the possibility of divestiture samples, respectively. According to Panel A of Table 4, the 3-day cumulative abnormal return is not significantly correlated with managerial ability. Turning to the control variables, firms with higher ability CEOs have higher Tobin-Q, better return on assets, more growth opportunities, higher free cash flows, and lower leverage ratio. It shows that higher ability CEOs are more likely to use stock instead of cash to finance M&A and to acquire private targets. Finally, higher ability CEOs are less likely to hold dual positions, and they have a higher equity compensation percentage. These findings are generally consistent with those from Table 3. While Panel B of Table 4 reveals that managerial ability is negatively correlated with both post-acquisition change in ROA and operating cash flows, Panel C shows that the likelihood and the magnitude of goodwill impairment are both negatively correlated with managerial ability score at the 0.05 significance level. Finally, Panel D shows that managerial ability is negatively correlated with the possibility of divestiture in the post-acquisition periods.

Table 4: Spearman Correlations among Selected Variables of M&A Sample

Panel A: Stock market reaction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ABILITY_SCORE_AVG	1.000						
ABILITY_RANKING_AVG	0.963***	1.000					
CAR	0.002	0.004	1.000				
SIZE	0.008	0.003	-0.050***	1.000			
TOBINQ	0.192***	0.203***	-0.036**	0.073***	1.000		
ROA	0.246***	0.250***	-0.012	0.039**	0.594***	1.000	
GROWTH	0.123***	0.115***	-0.007	-0.045**	0.331***	0.355***	1.000
FCF	0.211***	0.230***	0.001	0.073***	0.509***	0.664***	0.202***
LEVERAGE	-0.121***	-0.135***	0.016	0.293***	-0.340***	-0.279***	-0.169***
PRE_RET	-0.001	-0.002	-0.017	0.023	0.164***	0.085***	0.085***
CASH_DEAL	-0.029*	-0.022	0.050***	0.162***	-0.032*	0.026	-0.097***
STOCK_DEAL	0.068***	0.064***	-0.050***	-0.024	0.178***	0.061***	0.124***
PUBLIC	-0.053***	-0.051*	-0.086***	0.128***	0.053***	0.035**	-0.030*
DOMESTIC	-0.029	-0.034*	-0.022	0.096***	-0.007	-0.013	-0.028
RELATIVE_SIZE	-0.034*	-0.036**	0.058***	-0.576***	-0.2741***	-0.137***	-0.067***
BIDDERS	0.009	0.008	-0.029*	-0.016	-0.016	-0.018	0.003
DIVERSIFYING	0.028	0.034*	-0.014	0.143***	0.024	0.058***	-0.004
E_INDEX	-0.015	-0.004	0.017	-0.082***	-0.286***	-0.168***	-0.176***
CEO_CHAIR	-0.086***	-0.076***	0.007	0.083***	-0.100***	-0.035**	-0.042**
EQUITY_COMP	0.092***	0.092***	-0.032*	0.186***	0.246***	0.013	0.072***

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
FCF	1.000						
LEVERAGE	-0.263***	1.000					
PRE_RET	0.060***	-0.006	1.000				
CASH_DEAL	0.066***	0.031*	-0.078***	1.000			
STOCK_DEAL	-0.005	-0.077***	0.129***	-0.511***	1.000		
PUBLIC	0.031*	0.062***	0.014	-0.037***	0.117***	1.000	
DOMESTIC	0.013	0.068***	-0.020	0.096***	-0.119***	-0.023	1.000
RELATIVE_SIZE	-0.157***	-0.080***	-0.017	-0.235***	0.002	0.076***	-0.141***
BIDDERS	-0.003	0.023	-0.014	-0.016	0.014	0.209***	0.049***
DIVERSIFYING	0.085***	0.056***	0.041**	0.063***	0.017	0.007	-0.016
E_INDEX	-0.101***	0.133***	-0.067***	0.049***	-0.179***	-0.047***	0.012
CEO_CHAIR	-0.110***	0.235***	-0.035**	0.001	-0.024	0.068***	0.033*
EQUITY_COMP	0.037**	-0.178***	0.006	-0.035**	0.094***	-0.002	-0.006

	(15)	(16)	(17)	(18)	(19)	(20)
RELATIVE_SIZE	1.000					
BIDDERS	0.098***	1.000				
DIVERSIFYING	-0.134***	-0.014	1.000			
E_INDEX	0.184***	0.000	-0.057***	1.000		
CEO_CHAIR	-0.032	0.008	0.053***	-0.015	1.000	
EQUITY_COMP	-0.168***	-0.014	0.010	-0.077***	-0.167***	1

Panel B: Post-acquisition operating performance

	(1)	(2)	(3)	(4)
ABILITY_SCORE_AVG	1.000			
ABILITY_RANKING_AVG	0.963***	1.000		
CHG_ROA	-0.155***	-0.146***	1.000	
CHG_CF	-0.161***	-0.145***	0.588***	1.000

Panel C: Goodwill impairment

	(1)	(2)	(3)	(4)
ABILITY_SCORE_AVG	1.000			
ABILITY_RANKING_AVG	0.959***	1.000		
GOODWILL_DUM	-0.075**	-0.061*	1.000	
GOODWILL	-0.077**	-0.061	0.979***	1.000

Panel D: Divestiture

	(1)	(2)	(3)
ABILITY_SCORE_AVG	1.000		
ABILITY_RANKING_AVG	0.963***	1.000	
DIVEST	-0.088***	-0.099***	1.000

All variables are defined in Appendix A.
*, **, *and* *** indicates significance levels at 10%, 5%, and 1%, respectively.

Table 5 presents the multivariate regression results of testing the association between managerial ability and M&A quality using the four quality proxies, with Panel A using managerial ability score as the independent variable of interest and Panel B using managerial ability ranking as the independent variable of interest. For the dependent variables of 3-day cumulative stock returns (Column 1), changes in operating performance (Column 2 and 3), and the magnitude of goodwill impairment (Column 5), I use OLS regressions. For the dependent variables of the likelihood of goodwill impairment and divestiture (Column 4 and 6), I use logistic regressions.

As shown, managerial ability score is negatively associated with the likelihood of goodwill impairment (*z*-statistic = -1.96) and the likelihood of divestiture (*z*-statistic = -2.34), suggesting that the M&A conducted by higher ability CEOs are less likely to experience goodwill impairment and divestiture in the post-acquisition period. However, I find that managerial ability is negatively associated with the change in operating cash flows (*t*-statistic = -1.86), contradicting the prediction that the M&As conducted by higher ability CEOs lead to better post-acquisition operating performance. I do not find significant results when using the 3-day cumulative abnormal returns, the change in ROA, and the magnitude of goodwill impairment as dependent variables. Turning to the control variables, it shows that stock payments, public targets, and diversifying M&A are negatively associated with the 3-day cumulative abnormal stock return, and cash financed M&A have more positive stock returns. These results are consistent with prior literature (e.g., Travlos 1987; Wansley et al. 1987; Morck 1990; Chang 1998; Fuller et al. 2002; Goodman et al. 2013).

In sum, in the analysis of managerial ability and M&A quality, I find limited evidence to support the prediction that higher ability CEOs conduct higher quality M&A, using the above

four quality proxies. Specially, I find that the M&A conducted by higher ability CEOs are less likely to have goodwill impairment and divestiture in the post-acquisition period. However, the M&A made by higher ability CEOs perform worse in the post-acquisition era using the change in operating cash flow as the proxy.[13]

[13] I also adopt the propensity-score matching methodology to examine the association between managerial ability and the quality of M&A. I deploy the following model specification: $CAR\ (CHG\_ROA\ or\ CHG\_CF) = \beta_0 + \beta_1 ABILITY\_AVG + \beta_2 SIZE_{t-1} + \beta_3 TOBINQ_{t-1} + \beta_4 ROA_{t-1} + \beta_5 GROWTH_{t-1} + \beta_6 FCF_{t-1} + \beta_7 LEVERAGE_{t-1}$. The treatment variable indicates the treatment effect of M&A, equaling to 1 if it is a M&A firm, and zero otherwise. I use propensity-score matching method to construct the control sample. Results (untabulated) from this model specification do not provide significant results to support H1.

Table 5: The Association between Managerial Ability and M&A Quality

Panel A: Using managerial ability score

	(1) CAR[14] Coefficient (t-stat)	(2) CHG_ROA Coefficient (t-stat)	(3) CHG_CF Coefficient (t-stat)	(4) P(GOODWILL_DUM)[15] Coefficient (z-stat)	(5) GOODWILL Coefficient (t-stat)	(6) P(DIVESTITURE) Coefficient (z-stat)
ABILITY_SCORE_AVG	-0.008	-0.011	-0.043*	-2.282*	-244.484	-1.339**
	(-1.14)	(-0.25)	(-1.86)	(-1.96)	(-1.57)	(-2.34)
SIZE	-0.001	0.006*	-0.002	0.102	35.671	0.344***
	(-1.43)	(1.83)	(-0.68)	(0.71)	(1.61)	(5.15)
TOBINQ	0.001	-0.003	-0.006	0.298***	39.276**	0.066*
	(1.55)	(-0.80)	(-1.55)	(3.54)	(2.56)	(1.83)
ROA	-0.016	-0.313***	-0.062	-2.064	31.462	0.397
	(-1.12)	(-2.87)	(-0.75)	(-1.41)	(0.14)	(0.64)
GROWTH	0.006	-0.014	0.037**	-0.230	78.543	-0.204
	(1.51)	(-0.71)	(2.09)	(-0.67)	(1.16)	(-1.13)
FCF	0.024	0.008	-0.121*	-2.642	-506.297	-1.665***
	(1.50)	(0.16)	(-1.96)	(-1.35)	(-1.30)	(-3.00)
LEVERAGE	0.010	0.034*	0.033**	-0.144	-136.719	-0.209
	(1.42)	(1.86)	(2.01)	(-0.20)	(-1.65)	(-0.66)
PRE_RET	-0.004	-0.014	0.004	-0.123	-27.976	-0.033
	(-1.22)	(-0.98)	(0.71)	(-0.76)	(-0.62)	(-0.42)
CASH_DEAL	0.005***	-0.002	-0.005**	0.086	1.279	0.030
	(2.97)	(-0.47)	(-2.28)	(0.40)	(0.11)	(0.33)
STOCK_DEAL	-0.005**	-0.016**	-0.012	0.049	74.515	-0.047
	(-2.28)	(-2.13)	(-1.12)	(0.12)	(0.84)	(-0.26)
PUBLIC	-0.011***	0.015***	0.014***	-0.022	65.287	0.286***

[14] For Column (1), (2), (3), and (5), I use OLS regressions.
[15] For Column (4) and (6), I use Logistic regressions.

	(-5.40)	(2.68)	(3.17)	(-0.10)	(0.96)	(2.68)
DOMESTIC	-0.005**	-0.001	0.001	0.432**	1.773	0.014
	(-2.44)	(-0.22)	(0.32)	(2.07)	(0.05)	(0.12)
RELATIVE_SIZE	0.009	-0.037**	-0.050***	2.029***	85.009	1.113
	(0.54)	(-2.34)	(-2.86)	(2.61)	(1.21)	(1.53)
BIDDERS	-0.004	-0.006	-0.004	-2.080*	-152.963*	-0.301
	(-0.57)	(-0.77)	(-0.40)	(-1.80)	(-1.75)	(-0.93)
DIVERSIFYING	-0.003*	-0.005	-0.002	0.009	-3.741	-1.854***
	(-1.92)	(-1.21)	(-0.48)	(0.06)	(-0.24)	(-15.70)
E_INDEX	0.001	-0.001	0.000	0.037	1.079	-0.010
	(0.75)	(-0.37)	(0.05)	(0.28)	(0.26)	(-0.19)
CEO_CHAIR	0.003	-0.004	-0.006	-0.101	52.535	-0.028
	(1.17)	(-0.68)	(-1.20)	(-0.42)	(1.19)	(-0.24)
EQUITY_COMP	-0.000	-0.017***	-0.012	0.083	48.263	0.209
	(-0.04)	(-2.61)	(-1.50)	(0.13)	(0.89)	(1.42)
INTERCEPT	0.017	0.040	0.043**	13.072***	-275.390	-15.493***
	(1.02)	(1.47)	(1.97)	(10.80)	(-1.30)	(-12.79)
YEAR DUMMIES	Included	Included	Included	Included	Included	Included
INDUSTRY DUMMIES	Included	Included	Included	Included	Included	Included
N	3226	2898	2898	730	730	2966
R^2/ Pseudo R^2	0.050	0.288	0.219	0.138	0.127	0.176

Panel B: Using managerial ability ranking

	(1) CAR	(2) CHG_ROA	(3) CHG_CF	(4) P(GOODWILL_DUM)	(5) GOODWILL	(6) P(DIVESTITURE)
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	(t-stat)	(t-stat)	(t-stat)	(z-stat)	(t-stat)	(z-stat)
ABILITY_RANKING_AVG	-0.001	-0.001	-0.017	-1.112*	-105.371	-0.964***
	(-0.24)	(-0.06)	(-1.35)	(-1.94)	(-1.27)	(-3.33)
CONTROL VARIABLE	Included	Included	Included	Included	Included	Included
YEAR DUMMIES	Included	Included	Included	Included	Included	Included
INDUSTRY DUMMIES	Included	Included	Included	Included	Included	Included
N	3226	2898	2898	730	730	3208
R^2/ Pseudo R^2	0.050	0.288	0.217	0.137	0.125	0.179

All variables are defined in Appendix A.
Column (1), (2),(3), and (5) are estimated through OLS regression, and Column (4) and (6) are estimated through logistic regression.
t-Statistics or z-Statistics are presented in parenthesis below the coefficients and are corrected for heteroskedasticity and cross-sectional and time-series correlation using a two-way cluster at the firm and year level.
*, **, and *** indicates significance levels at 10%, 5%, and 1%, respectively.

5.2 Managerial Ability and Capital Investment

In this analysis, I keep observations with non-missing values in the variables as specified in the Model (4) and Model (5). The final sample in this set of analyses is 40,067 firm-year observations. All continuous variables are winsorized at 1% and 99% of their distributions to minimize the effect of outliers.[16]

In Table 6, I present the distribution of the capital investment sample by the two-digit SIC industry code. The industry with highest frequency in the capital investment sample is Business Services (17.68 percent, SIC code 73), followed Chemicals and Allied Products (15.86 percent, SIC code 28), and Instruments and Related Products (13.11 percent, SIC code 38).

Table 6: Distribution of Firm-Year Observations by Industry of Capital Investment Sample

	Two-digit SIC	# of Obs.	% of Sample	Cumulative Percent
Oil and Gas	13	183	0.46	0.46
Food, Beverage	20	547	1.37	1.82
Paper and Allied Products	26	237	0.59	2.41
Chemicals and Allied Products	28	6356	15.86	18.28
Rubber	30	386	0.96	19.24
Primary Metal Industries	33	382	0.95	20.19
Fabricated Metal Products	34	613	1.53	21.72
Industrial Machinery and Computer Equipment	35	4177	10.43	32.15
Electronic and Other Electric Equipment	36	5891	14.7	46.85
Transportation Equipment	37	1062	2.65	49.5
Instruments and Related Products	38	5252	13.11	62.61
Miscellaneous Manufacturing	39	485	1.21	63.82
Communication	48	752	1.88	65.7
Wholesale—Durable Goods	50	964	2.41	68.1
Wholesale—Non-Durable Goods	51	357	0.89	68.99
General Merchandise Store	53	389	0.97	69.97
Food Stores	54	205	0.51	70.48

[16] I also conduct the regressions with the non-winsorized data. I find that managerial ability is positively associated with total capital vestment and R&D, but not with capital expenditure and acquisition expenditure. Regarding the association analyses conditioning on firms' tendency towards over- and under-investment, the results using the actual investment levels are qualitatively consistent with those reported in Table 9, except no association found between managerial ability and capital expenditure; however, the results using abnormal levels become weaker.

Apparel and Accessory Stores	56	762	1.9	72.38
Furniture & Home furnishings Stores	57	184	0.46	72.84
Eating and Drinking	58	937	2.34	75.18
Miscellaneous Retail	59	907	2.26	77.44
Business Services	73	7085	17.68	95.12
Amusement and Recreation Services	79	234	0.58	95.71
Health Services	80	718	1.79	97.5
Engineering and Management Services	87	543	1.36	98.85
Nonclassifiable Establishments	99	459	1.15	100.00
		40,067	100.00	

Table 7 displays the descriptive statistics of the full sample, the descriptive statistics and difference tests by low versus high ability groups, and the Spearman correlations among selected variables. In Panel A of Table 7, the mean (median) of total capital investments of is 0.217 (0.141) of previous year's total assets. Regarding the components of total capital investments, the mean (median) of capital expenditure is 0.428 (0.250) of previous year's PPE, the mean (median) of R&D is 0.131 (0.066) of previous year's total assets, and the mean of acquisition expenditures is 0.028 of prior year's total assets. A median of zero for acquisition expenditures indicates that less than 50 percent of the firm-year observations have acquisitions during the sample period from 1993 to 2011. The managerial ability score has a mean (median) of -0.011 (-0.021), and the managerial ability ranking has a mean (median) of 0.545 (0.500). Panel B of Table 7 reports the descriptive statistics by low versus high managerial ability, using the industry median of the managerial ability score as a benchmark. It shows that the high ability group has a higher capital expenditures level and a higher acquisition expenditures level but a lower total capital investments and R&D level compared to the low ability group. The comparison statistics also show that the high ability group generally has lower abnormal investment levels compared to the low ability group. Panel C of Table 7 presents the Spearman correlations among selected variables. While R&D is negatively correlated with managerial ability, capital expenditures and

acquisition expenditures are shown to be positively correlated with the two ability variables. The managerial ability ranking is positively related to the total capital investment level. Turning to the abnormal investment levels, the abnormal levels of capital expenditures, R&D, and total capital investments are positively correlated with managerial ability. However, Panel B and Panel C should be interpreted with caution because they are univariate results.

Table 7: Descriptive Statistics of Capital Investment Sample

Panel A: Full sample

	N	Mean	Sd.	25 percentile	Median	75 percentile
INVT_TOT	40067	0.217	0.260	0.071	0.141	0.259
CAPX	40067	0.428	0.576	0.129	0.250	0.488
R&D	40067	0.131	0.206	0.013	0.066	0.160
ACQ	40067	0.028	0.091	0.000	0.000	0.004
AB_TOT	40067	-0.115	0.488	-0.180	-0.078	0.013
AB_CAPX	40067	-0.218	1.658	-0.379	-0.179	0.019
AB_R&D	40067	-0.082	0.391	-0.118	-0.039	0.001
AB_ACQ	40067	-0.014	0.153	-0.046	-0.027	-0.013
ABILITY_SCORE	40067	-0.011	0.152	-0.107	-0.021	0.070
ABILITY_RANKING	40067	0.545	0.282	0.300	0.500	0.800
OVERI	40067	0.550	0.247	0.350	0.550	0.750
SIZE	40067	4.585	2.263	3.045	4.473	5.998
MTOB	40067	3.042	4.053	1.229	1.839	3.154
LOSS	40067	0.459	0.498	0.000	0.000	1.000
SALE_VOL	40067	0.253	0.261	0.092	0.171	0.314
INVT_VOL	40067	0.102	0.138	0.026	0.057	0.122
CFO_SALE	40067	-1.293	7.271	-0.129	0.038	0.114
CFO_VOL	40067	0.155	0.248	0.044	0.082	0.161
SLACK	40067	6.452	16.747	0.268	1.320	5.463
DIV	40067	0.232	0.422	0.000	0.000	0.000
ZSCORE	40067	1.103	0.774	0.597	0.970	1.439
TANGIBILITY	40067	0.192	0.174	0.062	0.137	0.266
KSTRUCTURE	40067	0.109	0.177	0.000	0.016	0.148
IND_KSTRUCTURE	40067	0.109	0.083	0.055	0.079	0.137

Panel B: Descriptive Statistics of Selected Variables by Low versus High Ability

	Low Ability				High Ability				Difference Tests	
	N	Mean	SD	Median	N	Mean	SD	Median	t-test (p values)	wilcoxon (p values)
ABILITY_SCORE	20029	-0.125	-0.107	0.083	20038	0.103	0.070	0.115	0.000	0.000
ABILITY_RANKING	20029	0.309	0.300	0.152	20038	0.782	0.800	0.156	0.000	0.000
INVT_TOT	20029	0.221	0.144	0.260	20038	0.213	0.138	0.259	0.001	0.000
CAPX	20029	0.378	0.214	0.543	20038	0.477	0.288	0.604	0.000	0.000
R&D	20029	0.145	0.077	0.211	20038	0.118	0.053	0.199	0.000	0.000
ACQ	20029	0.024	0.000	0.084	20038	0.032	0.000	0.097	0.000	0.000
AB_TOT	20029	-0.126	-0.088	0.498	20038	-0.105	-0.069	0.478	0.000	0.000
AB_CAPX	20029	-0.253	-0.219	1.451	20038	-0.182	-0.135	1.841	0.000	0.000
AB_R&D	20029	-0.083	-0.046	0.402	20038	-0.080	-0.032	0.380	0.471	0.000
AB_ACQ	20029	-0.018	-0.027	0.158	20038	-0.010	-0.026	0.148	0.000	0.000

Panel C: Spearman Correlations among Selected Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ABILITY_SCORE	1.000									
ABILITY_RANKING	0.962***	1.000								
INVT_TOT	0.002	0.026***	1.000							
CAPX	0.185***	0.180***	0.413***	1.000						
R&D	-0.096***	-0.049***	0.720***	0.190***	1.000					
ACQ	0.084***	0.069***	0.195***	0.111***	-0.105***	1.000				
AB_TOT	0.050***	0.039***	0.548***	0.217***	0.232***	0.154***	1.000			
AB_CAPX	0.146***	0.128***	0.175***	0.640***	-0.027***	0.051***	0.382***	1.000		
AB_R&D	0.014***	0.001	0.380***	0.088***	0.340***	-0.106***	0.786***	0.248***	1.000	
AB_ACQ	0.033***	0.047***	0.127***	-0.055***	-0.107***	0.498***	0.313***	0.160***	0.0041	1.000

All variables are defined in Appendix A.
, **, and * indicates significance levels at 10%, 5%, and 1%, respectively.*

I first run multivariate regressions to investigate the association between managerial ability and actual investments and the association between managerial ability and abnormal investments without conditioning on firms' tendency towards over- or under-investment (Model 4). The results are tabulated in Table 8. Both the managerial ability score (Panel A of Table 8) and the ranking (Panel B of Table 8) are positively associated with total capital investments and the three components of total capital investments (capital expenditures, R&D, and acquisition expenditures). The *t*-statistics range from 2.64 (2.83) for the acquisition expenditures to 5.41 (6.19) for the total capital investments when using the managerial ability score (managerial ability ranking). Meanwhile, the multivariate regressions of abnormal investments on managerial ability reveal that managerial ability is positively associated with abnormal total capital investments, abnormal capital expenditures, and abnormal R&D.[17]

[17] Managerial ability ranking, but not managerial ability score, is positively associated with abnormal acquisition expenditure.

Table 8: The Unconditional Association between Managerial Ability and Capital Investment Levels/Abnormal Capital Investment Levels (N =40,067)

Panel A: using managerial ability score

	(1) INVT_TOT Coefficient (t-stat)	(2) CAPX Coefficient (t-stat)	(3) R&D Coefficient (t-stat)	(4) ACQ Coefficient (t-stat)	(5) AB_TOT Coefficient (t-stat)	(6) AB_CAPX Coefficient (t-stat)	(7) AB_R&D Coefficient (t-stat)	(8) AB_ACQ Coefficient (t-stat)
ABILITY_SCORE	0.099***	0.192***	0.063***	0.008***	0.080***	0.137*	0.049**	0.008
	(5.41)	(3.07)	(4.52)	(2.64)	(2.72)	(1.88)	(2.39)	(1.53)
SIZE	-0.008***	0.013**	-0.012***	0.002***	-0.008***	0.010***	-0.010***	0.001
	(-4.82)	(2.22)	(-7.64)	(7.05)	(-2.96)	(3.26)	(-6.31)	(1.51)
MTOB	0.020***	0.028***	0.015***	0.001***	0.020***	0.025***	0.015***	0.000
	(10.35)	(4.31)	(8.25)	(5.60)	(7.22)	(4.30)	(7.45)	(0.66)
LOSS	0.009**	-0.069***	0.039***	-0.020***	0.017**	-0.045***	0.048***	-0.021***
	(2.33)	(-4.69)	(15.41)	(-12.56)	(2.23)	(-2.75)	(7.76)	(-10.39)
SALE_VOL	-0.023***	0.116***	-0.034***	0.001	-0.018**	0.096**	-0.028***	0.003
	(-2.76)	(5.30)	(-4.81)	(0.44)	(-1.96)	(1.97)	(-3.02)	(0.50)
INVT_VOL	0.338***	1.403***	0.577***	0.150***	0.313***	1.556***	0.547***	0.146***
	(8.78)	(6.96)	(11.60)	(7.50)	(8.11)	(3.61)	(9.93)	(8.42)
CFO_SALE	-0.003***	0.001	-0.002***	0.000	-0.003***	0.000	-0.003***	0.000
	(-5.74)	(0.91)	(-4.71)	(0.27)	(-3.00)	(0.22)	(-3.66)	(0.22)
CFO_VOL	0.010	-0.038	-0.065***	-0.003	0.032	-0.015	-0.051**	-0.000
	(0.71)	(-1.28)	(-4.43)	(-1.11)	(1.40)	(-0.47)	(-2.47)	(-0.08)
SLACK	-0.001***	0.008***	-0.000***	-0.000	-0.000	0.008***	-0.000	-0.000
	(-3.21)	(5.86)	(-3.17)	(-0.65)	(-0.99)	(5.52)	(-1.64)	(-1.37)
DIV	-0.012***	-0.059***	-0.007***	0.000	-0.009**	-0.090***	-0.004	0.002
	(-2.97)	(-7.65)	(-2.60)	(0.22)	(-2.36)	(-3.83)	(-1.53)	(1.03)
ZSCORE	-0.013***	0.007	-0.007**	-0.003***	-0.012**	0.006	-0.007**	-0.001
	(-3.03)	(0.61)	(-2.12)	(-3.40)	(-2.41)	(0.52)	(-1.99)	(-0.67)

TANGIBILITY	0.085***	-0.774***	-0.016	-0.018***	0.129***	-0.720***	0.022	-0.025***
	(4.99)	(-12.01)	(-1.50)	(-5.03)	(3.88)	(-14.15)	(1.00)	(-3.31)
KSTRUCTURE	-0.116***	-0.197***	-0.032***	-0.020***	-0.119***	-0.235***	-0.042***	-0.019
	(-9.74)	(-7.01)	(-4.51)	(-6.50)	(-10.55)	(-7.65)	(-6.33)	.
IND_KSTRUCTURE	-0.130***	-0.057	-0.097***	0.006	-0.256	0.634	-0.276**	0.071*
	(-3.40)	(-0.93)	(-3.65)	(0.62)	(-1.61)	(1.55)	(-2.11)	(1.92)
INTERCEPT	0.093***	0.545***	0.022	0.023***	-0.034	-0.419***	0.030	-0.021
	(2.90)	(4.75)	(0.89)	(2.98)	(-1.05)	(-2.87)	(0.80)	(-1.48)
INDUSTRY DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
YEAR DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R^2	0.307	0.223	0.484	0.050	0.232	0.087	0.264	0.056

Panel B: using managerial ability ranking

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	INVT_TOT	CAPX	R&D	ACQ	AB_TOT	AB_CAPX	AB_R&D	AB_ACQ
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
ABILITY_RANKING	0.051***	0.106***	0.030***	0.005***	0.049***	0.078***	0.031***	0.004**
	(6.19)	(3.66)	(4.97)	(2.83)	(4.77)	(3.84)	(4.13)	(2.02)
CONTROL VARIABLES	Included	0.446***	0.009	0.027***	-0.163***	-0.618***	-0.052	-0.034**
INDUSTRY DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
YEAR DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R^2	0.307	0.223	0.483	0.050	0.232	0.087	0.264	0.056

All variables are defined in Appendix A.
t-statistics are presented in parenthesis below the coefficients and are corrected for heteroskedasticity and cross-sectional and time-series correlation using a two-way cluster at the firm and year level.
*, **, *and* *** indicates significance levels at 10%, 5%, and 1%, respectively.

Next, I conduct tests to investigate the association between capital investment and managerial ability conditioned on firms' tendency towards over- or under-investment (Model 5). The results are reported in Table 9. As shown in Columns 1−4, I find evidence that both managerial ability score and ability ranking are positively associated with R&D, acquisition expenditures, and total capital investment when firms are most likely to under-invest. Using total investments as an example, one standard deviation increase in the managerial ability score results in an increase of 0.032 in total capital investments among firms that are likely to under-invest. Considering the mean value of total capital investments (deflated by previous year's total assets) is 0.217, this reflects an increase of 14.8 percent. However, I do not find the same effect on capital expenditures when firms are predicted to likely under-invest. Further, the results show that as the likelihood of over-investment increases, higher ability CEOs tend to reduce total capital investments and acquisition expenditures, indicated by the negative and significant coefficient of the interaction between managerial ability and over-investment likelihood (*OVERI*). However, I find an opposite result for capital expenditures. The result of the capital expenditures variable suggests that when firms are more likely to over-invest, higher ability CEOs tend to increase their capital expenditures level.

Overall, the results indicate that when firms have a predisposition towards under-investment, higher ability CEOs are shown to increase the levels of R&D, acquisition expenditures, and total capital investments, but not the level of capital expenditures; when firms have an increasing likelihood of over-investment, managerial ability tend to decrease the levels of acquisition expenditures and total capital investments but to increase the level of capital expenditures.

Turning to the control variables, the estimated coefficients are consistent with prior literature (e.g., Biddle and Hilary 2006; Biddle et al. 2009). For example, growing firms (*MTOB*) are more likely to increase investment levels; distributing dividends (*DIV*) negatively affects the investment level of the next period; and the likelihood of bankruptcy (*ZSCORE*) and a capital structure with higher ratio of leverage (*KSTRUCTURE*) are negatively associated with investment levels.

I also test the association between managerial ability and the abnormal investment levels conditional on firms' tendency to over-invest and under-invest. Columns 5−8 of Table 9 display the results. Generally speaking, the results of abnormal investment levels are consistent with those reported in Columns 1−4 of Table 9. Specifically, when firms are most likely to under-invest, the abnormal R&D, abnormal acquisition expenditures, and abnormal total capital investments is increasing with managerial ability, respectively. Managerial ability tends to decrease the abnormal levels of total capital investments, R&D, and acquisition expenditures as firms' likelihood of over-investment is increasing.

Together, the earlier association tests without conditioning on firms' tendency towards over- or under-investment show that, generally, higher ability CEOs make higher levels of capital investment. They are also associated with higher abnormal capital investment level. More importantly, the conditional association tests reveal that when firms are very likely to under-invest, higher ability CEOs have a tendency to increase R&D, acquisition expenditures, and total capital investments. CEOs also tend to increase abnormal R&D, abnormal acquisition expenditures, and abnormal total capital investments when firms have a higher likelihood of under-investing. When firms' likelihood of over-investing is increasing, higher ability CEOs decrease acquisition expenditures and total capital investments. Higher ability CEOs are also

shown to decrease abnormal R&D, abnormal acquisition expenditures, and abnormal total capital investments when firms' likelihood of over-investing is high. However, the results show that higher ability CEOs increase capital expenditures even when firms have the tendency to over-invest. The above results provide evidence to the prediction that managerial ability can improve capital investment efficiency and alleviate the agency problems.

Table 9: The Conditional Association between Managerial Ability and Capital Investment Levels/Abnormal Capital Investment Levels
(N = 40,067)

Panel A: using managerial ability score

	INVT_TOT	CAPX	R&D	ACQ	AB_TOT	AB_CAPX	AB_R&D	AB_ACQ
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
ABILITY_SCORE	0.208***	-0.048	0.091***	0.042***	0.250***	-0.205	0.125***	0.043***
	(5.45)	(-0.65)	(3.70)	(5.11)	(6.07)	(-1.57)	(3.89)	(3.85)
OVERI	0.024	0.267***	0.040***	-0.041***	0.034**	0.300***	0.054***	-0.040***
	(1.60)	(6.92)	(4.31)	(-8.08)	(2.00)	(7.19)	(4.10)	(-8.76)
OVERI_ABILITY	-0.182***	0.402**	-0.046	-0.057***	-0.285***	0.574***	-0.127*	-0.057***
	(-3.68)	(2.26)	(-1.34)	(-5.02)	(-3.22)	(2.68)	(-1.74)	(-2.86)
SIZE	-0.009***	0.012**	-0.012***	0.002***	-0.008***	0.009***	-0.011***	0.001*
	(-4.82)	(2.21)	(-7.55)	(7.60)	(-3.05)	(3.52)	(-6.33)	(1.71)
MTOB	0.020***	0.027***	0.015***	0.001***	0.020***	0.024***	0.015***	0.000
	(10.18)	(4.48)	(8.05)	(5.20)	(7.09)	(4.50)	(7.21)	(0.74)
LOSS	0.010**	-0.056***	0.040***	-0.022***	0.017**	-0.030*	0.050***	-0.023***
	(2.37)	(-3.86)	(16.32)	(-12.08)	(2.29)	(-1.96)	(7.91)	(-10.65)
SALE_VOL	-0.023***	0.116***	-0.035***	0.002	-0.018*	0.095*	-0.028***	0.004
	(-2.75)	(5.21)	(-4.93)	(0.86)	(-1.95)	(1.94)	(-3.11)	(0.68)
INVT_VOL	0.337***	1.234***	0.573***	0.134***	0.310***	1.364***	0.541***	0.131***
	(8.71)	(6.52)	(11.40)	(7.26)	(7.91)	(3.17)	(9.63)	(8.17)
CFO_SALE	-0.003***	0.001	-0.002***	0.000	-0.003***	0.000	-0.003***	0.000
	(-5.65)	(0.71)	(-4.64)	(0.76)	(-2.82)	(0.01)	(-3.51)	(0.79)
CFO_VOL	0.012	-0.010	-0.061***	-0.007**	0.035	0.017	-0.046**	-0.004
	(0.82)	(-0.35)	(-4.04)	(-2.34)	(1.48)	(0.55)	(-2.16)	(-0.86)
SLACK	-0.001***	0.007***	-0.001***	0.000	-0.000	0.007***	-0.001*	-0.000
	(-3.10)	(5.86)	(-3.31)	(1.49)	(-1.06)	(5.38)	(-1.92)	(-0.50)

DIV	-0.011***	-0.043***	-0.005*	-0.002	-0.007*	-0.072***	-0.000	-0.000
	(-2.60)	(-5.19)	(-1.74)	(-1.51)	(-1.70)	(-2.97)	(-0.15)	(-0.09)
ZSCORE	-0.013***	0.022*	-0.005	-0.005***	-0.012**	0.023**	-0.005	-0.004**
	(-2.86)	(1.92)	(-1.58)	(-4.92)	(-2.39)	(2.06)	(-1.34)	(-2.22)
TANGIBILITY	0.094***	-0.716***	-0.008	-0.025***	0.142***	-0.659***	0.035	-0.031***
	(5.09)	(-12.87)	(-0.73)	(-5.92)	(3.94)	(-16.57)	(1.43)	(-4.37)
KSTRUCTURE	-0.098***	-0.047	-0.007	-0.042***	-0.093***	-0.070	-0.007	-0.041***
	(-7.77)	(-1.52)	(-0.93)	(-8.44)	(-7.33)	(-1.59)	(-0.81)	(-16.09)
IND_KSTRUCTURE	-0.124***	-0.033	-0.091***	0.002	-0.247	0.659	-0.268**	0.067*
	(-3.31)	(-0.59)	(-3.57)	(0.22)	(-1.57)	(1.61)	(-2.08)	(1.82)
INTERCEPT	0.074**	0.368***	-0.007	0.051***	-0.060*	-0.617***	-0.009	0.006
	(2.43)	(2.94)	(-0.29)	(6.79)	(-1.85)	(-4.26)	(-0.24)	(0.45)
INDUSTRY DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
YEAR DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R^2	0.308	0.231	0.485	0.058	0.232	0.088	0.265	0.058

Panel B: using managerial ability ranking

	(1) INVT_TOT Coefficient (t-stat)	(2) CAPX Coefficient (t-stat)	(3) R&D Coefficient (t-stat)	(4) ACQ Coefficient (t-stat)	(5) AB_TOT Coefficient (t-stat)	(6) AB_CAPX Coefficient (t-stat)	(7) AB_R&D Coefficient (t-stat)	(8) AB_ACQ Coefficient (t-stat)
ABILITY_RANKING	0.097***	-0.013	0.039***	0.021***	0.120***	-0.088***	0.060***	0.015***
	(6.09)	(-0.41)	(3.90)	(4.60)	(4.83)	(-3.20)	(2.92)	(3.85)
OVERI	0.071***	0.146*	0.049***	-0.025***	0.107***	0.131*	0.083***	-0.029***
	(3.65)	(1.88)	(3.89)	(-4.91)	(3.42)	(1.82)	(2.95)	(-6.26)
OVERI_ABILITY	-0.081***	0.215***	-0.014	-0.028***	-0.125**	0.297***	-0.050	-0.019***
	(-3.53)	(2.59)	(-0.87)	(-4.58)	(-2.55)	(3.42)	(-1.20)	(-3.68)
CONTROL VARIABLES	Included	Included	Included	Included	Included	Included	Included	Included

INDUSTRY DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
YEAR DUMMIES	Included	Included	Included	Included	Included	Included	Included	Included
Adj. R^2	0.308	0.231	0.485	0.058	0.232	0.088	0.265	0.058

All variables are defined in Appendix A.
t-statistics are presented in parenthesis below the coefficients and are corrected for heteroskedasticity and cross-sectional and time-series correlation using a two-way cluster at the firm and year level.
*, **, *and* *** indicates significance levels at 10%, 5%, and 1%, respectively.

5.3 Managerial Ability and the Value of Cash

In the examination of the association of managerial ability and the value of cash, both financial services industries (with SIC codes between 6000 and 6999) and utility industries (with SIC codes between 4900 and 4999) are excluded from the analyses, because the liquidity of the firms in the financial industries is hard to assess and the utility sector complies with a special regulatory system (e.g., Dittmar and Smith 2007; Liu and Mauer 2011). The final sample consists of 58,336 firm-year observations. All data are adjusted to real value in 2011 dollars using the consumer price index (CPI), and all continuous variables are winsorized at the 1% and 99% of their distributions to minimize the effect of outliers.

Table 10 displays the distribution of the value of cash sample by the two-digit SIC industry code. The industry with the highest frequency is Business Services (10.95 percent, SIC code 73), followed Chemicals and Allied Products (9.95 percent, SIC code 28), and Electronic and Other Electric Equipment (9.33 percent, SIC code 36).

Table 10: Distribution of Firm-Year Observations by Industry of The Value of Cash Sample

	Two-digit SIC	# of Obs.	% of Sample	Cumulative Percent
Metal Mining, Ores	10	775	1.33	1.33
Oil and Gas	13	2626	4.50	5.83
General Building Contractors	15	403	0.69	6.52
Heavy Construction, Except Building	16	287	0.49	7.01
Food, Beverage	20	1,647	2.82	9.83
Textile Mill Products	22	368	0.63	10.46
Apparel and Other Textile Products	23	650	1.11	11.57
Lumber and Wood Products	24	377	0.65	12.22
Furniture and Fixtures	25	474	0.81	13.03
Paper and Allied Products	26	794	1.36	14.39
Printing and Publishing	27	830	1.42	15.81
Chemicals and Allied Products	28	5,802	9.95	25.76
Petroleum	29	593	1.02	26.78
Rubber	30	769	1.32	28.10

Leather & Leather Products	31	234	0.40	28.50
Stone, Clay, & Glass Products	32	427	0.73	29.23
Primary Metal Industries	33	1,036	1.78	31.01
Fabricated Metal Products	34	978	1.68	32.69
Industrial Machinery and Computer Equipment	35	4,278	7.33	40.02
Electronic and Other Electric Equipment	36	5,444	9.33	49.35
Transportation Equipment	37	1,579	2.71	52.06
Instruments and Related Products	38	4,262	7.31	59.37
Miscellaneous Manufacturing	39	671	1.15	60.52
Railroad Transportation	40	211	0.36	60.88
Trucking & Warehousing	42	541	0.93	61.81
Water Transportation	44	439	0.75	62.56
Air Transportation	45	470	0.81	63.37
Communication	48	2,317	3.97	67.34
Wholesale—Durable Goods	50	1,637	2.81	70.15
Wholesale—Non-Durable Goods	51	884	1.52	71.67
Building Materials & Gardening Supplies	52	148	0.25	71.92
General Merchandise Store	53	468	0.80	72.72
Food Stores	54	436	0.75	73.47
Auto Dealers, Gas Stations	55	333	0.57	74.04
Apparel and Accessory Stores	56	606	1.04	75.08
Furniture & Home furnishings Stores	57	321	0.55	75.63
Eating and Drinking	58	1,030	1.77	77.40
Miscellaneous Retail	59	1,204	2.06	79.46
Hotels & Other Lodging Places	70	226	0.39	79.85
Personal Services	72	224	0.38	80.23
Business Services	73	6,387	10.95	91.18
Motion Pictures	78	351	0.60	91.78
Amusement and Recreation Services	79	644	1.10	92.88
Health Services	80	1,256	2.15	95.03
Educational Services	82	257	0.44	95.47
Social Services	83	121	0.21	95.68
Engineering and Management Services	87	1,090	1.87	97.55
Nonclassifiable Establishments	99	270	0.46	98.01
Other Industries[18]		1,161	1.99	100.00
		58,336	100.00	

[18] Industries whose observations are less than 200 are aggregate into this category.

In Table 11, I present the descriptive statistics of the full sample, the descriptive statistics and difference tests of low versus high ability groups, and the Spearman correlation matrix of the selected variables in the analysis of managerial ability and the value of cash.

In Panel A of Table 11, The managerial ability score has an average (median) of -0.010 (-0.018) and the variable of managerial ability ranking has an average of 0.545 (0.500). The mean of the excess stock return is positive (0.034) while the median is negative (-0.076), indicating the skewness of the excess stock return distribution. Turning to the financial characteristics, the sample firms have positive yearly changes in cash balance, earnings, and net assets. The mean leverage is 0.228 and the average of cash (deflated by the lagged market value of the equity) is 0.172.

Panel B of Table 11 displays descriptive statistics by low versus high managerial ability, using the industry median of the managerial ability score as a benchmark. As it shows, managerial ability score and ranking are significantly higher in the high ability group. Specifically, the mean value of the managerial ability score (ranking) for the high ability group is 0.096 (0.773), while it is -0.117 (0.318) in the low ability group. The excess stock return is significantly higher in the high ability group (with a mean value of 0.083 and a median of -0.030) compared to that in the low ability group (with a mean value of -0.015 and -0.126). Firms in the high ability group significantly outperform those in the low ability group in the yearly changes of cash, earnings, net assets, and R&D. Finally, firms in the high ability group have lower cash levels, leverage, and net finance figures.

The Spearman correlation matrix in Panel C of Table 11 shows that managerial ability (both managerial ability score and ranking) is positively correlated with excess annual stock returns, change in cash, change in earnings, change in net assets, change in R&D, change in

interest, and change in dividend payout. Meanwhile, managerial ability is negatively correlated with cash level, leverage, and net finance.

Table 11: Descriptive Statistics of the Value of Cash Sample

Panel A: Full sample

Variable	N	Mean	Sd.	25 Percentile	Median	75 Percentile
ABILITY_SCORE	58336	-0.010	0.140	-0.099	-0.018	0.070
ABILITY_RANKING	58336	0.545	0.275	0.300	0.500	0.800
EX_RET	58336	0.034	0.659	-0.345	-0.076	0.233
Δ*C*	58336	0.008	0.137	-0.029	0.001	0.036
Δ*E*	58336	0.027	0.262	-0.031	0.007	0.046
Δ*NA*	58336	0.018	0.449	-0.067	0.017	0.118
Δ*RD*	58336	-0.001	0.023	0.000	0.000	0.001
Δ*I*	58336	0.001	0.024	-0.003	0.000	0.003
Δ*D*	58336	0.000	0.007	0.000	0.000	0.000
C	58336	0.172	0.236	0.030	0.088	0.213
L	58336	0.228	0.232	0.026	0.160	0.360
NF	58336	0.038	0.232	-0.034	0.001	0.060

Panel B: By Low versus High Managerial Ability

	Low Ability				High Ability				Difference Tests	
	N	Mean	Median	Sd.	N	Mean	Median	Sd.	t-test (p value)	Wilconxon-test (p value)
ABILITY_SCORE	29165	-0.117	-0.099	0.080	29171	0.096	0.070	0.099	0.000	0.000
ABILITY_RANKING	29165	0.318	0.300	0.152	29171	0.773	0.800	0.156	0.000	0.000
EX_RET	29165	-0.015	-0.126	0.671	29171	0.083	-0.030	0.643	0.000	0.000
Δ*C*	29165	0.005	0.000	0.151	29171	0.011	0.002	0.121	0.000	0.000
Δ*E*	29165	0.021	0.003	0.295	29171	0.033	0.009	0.224	0.000	0.000
Δ*NA*	29165	-0.039	-0.002	0.472	29171	0.076	0.036	0.418	0.000	0.000
Δ*RD*	29165	-0.003	0.000	0.026	29171	0.001	0.000	0.019	0.000	0.000
Δ*I*	29165	0.000	0.000	0.027	29171	0.001	0.000	0.022	0.302	0.000
Δ*D*	29165	0.000	0.000	0.008	29171	0.000	0.000	0.007	0.000	0.000
C	29165	0.195	0.103	0.257	29171	0.149	0.077	0.210	0.000	0.000
L	29165	0.253	0.186	0.247	29171	0.203	0.137	0.214	0.000	0.000
NF	29165	0.043	0.001	0.247	29171	0.033	0.000	0.216	0.000	0.000

Panel C: Spearman correlations

	(1)	(2)	(3)	(4)	(5)	(6)
ABILITY_SCORE	1.000					
ABILITY_RANKING	0.952***	1.000				
EX_RET	0.127***	0.125***	1.000			
Δ*C*	0.041***	0.038***	0.221***	1.000		
Δ*E*	0.096***	0.090***	0.313***	0.143***	1.000	
Δ*NA*	0.217***	0.199***	0.181***	-0.044***	0.137***	1.000
Δ*RD*	0.108***	0.100***	0.043***	0.036***	-0.097***	0.182***
Δ*I*	0.038***	0.027***	-0.089***	-0.022***	-0.002	0.299***
Δ*D*	0.098***	0.090***	0.086***	0.032***	0.045***	0.136***
C	-0.111***	-0.096***	0.041***	-0.229***	0.030***	-0.084***

L	-0.107***	-0.129***	-0.204***	-0.057***	-0.048***	-0.040***
NF	-0.027***	-0.022***	0.001	0.150***	-0.009*	0.418***

	(7)	(8)	(9)	(10)	(11)	(12)
Δ*RD*	1.000					
Δ*I*	0.052***	1.000				
Δ*D*	0.058***	0.015***	1.000			
C	-0.021***	-0.088***	-0.067***	1.000		
L	-0.106***	0.129***	-0.077***	-0.156***	1.000	
NF	0.064***	0.343***	0.026***	-0.058***	0.007	1.000

All variables are defined in Appendix A.

*, **, *and* *** indicates significance levels at 10%, 5%, and 1%, respectively.

Table 12 presents the results of multivariate regression analyses of managerial ability and the value of cash (Model 7). I first estimate the original model proposed by Faulkender and Wang (2006), with the results tabulated in Column 1 of Table 12. The results are consistent with prior literature (e.g., Faulkender and Wang 2006; Dittmar and Smith 2007; Liu and Mauer 2011). According to the estimation of the original model, the coefficient estimate corresponding to the change in cash balance indicates that shareholders value one marginal dollar of cash at $2.187. In addition, as the level of cash increases, the value of cash to shareholders decreases, indicated by the significantly negative coefficient estimate of the interaction between change in cash and the level of cash (*t*-statistic = -8.29). Leverage also has a negative impact on the value of cash, reflected in the significantly negative coefficient estimate of the interaction between change in cash and leverage (*t*-statistic = -8.72). As well, the change in earnings, net assets, and dividends are shown to positively affect the excess stock return while change in interest is negatively associated with excess stock return. To estimate the incremental effect of managerial ability on the value of cash, I add the two managerial ability variables and their interaction with the change in cash ($\Delta C_ABILITY$) to the original model. The results are tabulated in Columns 2 and 3 of Table 8. The value of cash attached by shareholders is positively and marginally significantly related to managerial ability score (with a coefficient of 0.404 and *t*-statistic = 1.83) and positively and significantly associated with managerial ability ranking (with a coefficient of 0.404 and *t*-statistic = 3.85). The coefficients and significance of other variables in these two multivariate regressions are consistent with those in the original model.

Table 12: The Association between Managerial Ability and the Value of Cash (N = 58,336)

	(1) EX_RET Coefficient (t-stat)	(2) EX_RET Coefficient (t-stat)	(3) EX_RET Coefficient (t-stat)
ΔC	2.187***	2.194***	1.986***
	(15.84)	(15.45)	(14.33)
ABILITY_SCORE		0.202***	
		(4.62)	
ΔC*_ABILITY_SCORE*		0.488*	
		(1.83)	
ABILITY_RANKING			0.109***
			(5.03)
ΔC*_ABILITY_RANKING*			0.404***
			(3.85)
ΔE	0.504***	0.498***	0.498***
	(10.76)	(10.65)	(10.62)
ΔNA	0.207***	0.195***	0.195***
	(7.32)	(7.17)	(7.04)
ΔRD	0.608*	0.516	0.517
	(1.75)	(1.52)	(1.50)
ΔI	-1.844***	-1.836***	-1.831***
	(-6.76)	(-6.83)	(-6.82)
ΔD	1.788**	1.657**	1.667**
	(2.26)	(2.07)	(2.08)
C	0.455***	0.464***	0.465***
	(5.20)	(5.36)	(5.36)
L	-0.505***	-0.493***	-0.490***
	(-7.20)	(-6.85)	(-6.78)
NF	0.006	0.020	0.020
	(0.12)	(0.43)	(0.43)
ΔC_C	-1.054***	-1.039***	-1.024***
	(-8.29)	(-8.25)	(-7.97)
ΔC_L	-2.081***	-2.069***	-2.065***
	(-8.72)	(-8.66)	(-8.67)
INTERCEPT	0.031**	0.028**	-0.035
	(2.22)	(2.01)	(-1.51)
R^2	0.217	0.219	0.219

All variables are defined in Appendix A.

t-statistics are presented in parenthesis below the coefficients and are corrected for heteroskedasticity and cross-sectional and time-series correlation using a two-way cluster at the firm and year level.
*, **, and *** indicates significance levels at 10%, 5%, and 1&, respectively.

Next, I investigate the pattern of the association between the value of cash and managerial ability in the financially constrained and financially unconstrained context. Results are tabulated in Table 13.

Consistent with prior literature on the value of cash, shareholders attach higher value to the cash of financially constrained firms, suggested by the larger size of the coefficient estimates of change in cash when firms are classified as being financially constrained. Taking the first criterion (the payout ratio) as an example, a one dollar increase in cash is valued by shareholders at $2.355 ($1.419) when the firm is financially constrained (unconstrained). This is because cash, as an important source of internal capital, is critical to support identified investment opportunities when external funds are costly or impossible to obtain (Myers and Majluf 1984; Fazzari et al. 1988; Almeida et al. 2004; Faulkender and Wang 2006; Denis and Sibilkov 2010). I find evidence that, whether firms are financially constrained or not, the value of cash is higher if the cash is managed by more able CEOs. When firms are financially constrained, cash is in urgent need so that value-increasing investment opportunities will not be bypassed. The significant and positive impact of managerial ability on the value of cash (i.e., the positive and significant coefficient of the interaction between managerial ability score when using the annual payout ratio as the criterion) indicates that shareholders believe that more able CEOs are better at making use of the needed cash. When firms are financially unconstrained, more able CEOs also create more value out of the free cash that is not in urgent need, as indicated by the consistently positive coefficients of the interaction terms when using the debt rating and short-term paper rating as criteria.

Overall, the results in this set of analyses support the hypothesis that the value of cash is higher for the firms that hire more able CEOs, as evidenced by the positive and significant incremental effect of managerial ability on the value of cash. A further investigation of this association in the financially constrained and financially unconstrained contexts suggests that regardless of the availability of cash and the accessibility to external funds, the value of cash is higher if the cash is managed by higher ability CEOs.[19]

[19] I also conduct all the analyses using only continuous samples by excluding the firm-year observations with CEO turnover. The untabulated results for the M&A analyses are generally consistent except that there is a negative and siginificant association between managerial ability and change in ROA. The untabulated results for the capital investment analyses are weaker, especially for using abnormal investments. Especially, the results on the capital expenditures are opposite-higher ability tend to decrease capital expenditures as firms are more likely to over-invest. The untabulated results for the value of cash analysis are consistent.

Table 13: The Association between Managerial Ability and the Value of Cash in Financially Constrained and Unconstrained Firms

Panel A: Using managerial ability score

	Payout Ratio		*Firm Size*		*Debt Rating*		*Paper Rating*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
ΔC	2.355***	1.419***	2.255***	2.057***	2.292***	2.033***	2.234***	2.016***
	(16.86)	(6.71)	(16.28)	(5.31)	(14.66)	(15.23)	(17.06)	(11.15)
ABILITY_SCORE	0.328***	0.064**	0.417***	-0.000	0.185***	0.226***	0.222***	0.190***
	(6.05)	(2.38)	(9.28)	(-0.00)	(3.80)	(4.66)	(4.37)	(4.56)
$\Delta C\_ABILITY$	0.830***	0.816	0.733	0.293	0.370	0.721***	0.342	0.956***
	(3.03)	(1.06)	(1.63)	(0.67)	(1.02)	(2.73)	(0.96)	(3.63)
ΔE	0.452***	0.713***	0.463***	0.500***	0.459***	0.566***	0.477***	0.567***
	(9.66)	(8.59)	(9.56)	(10.59)	(12.11)	(8.28)	(11.60)	(6.82)
ΔNA	0.189***	0.170***	0.236***	0.121***	0.217***	0.152***	0.186***	0.217***
	(7.07)	(5.77)	(7.83)	(4.18)	(7.80)	(4.93)	(7.47)	(4.11)
ΔRD	0.457	0.248	0.641**	-0.224	0.370	0.694	0.586*	0.404
	(1.40)	(0.33)	(2.11)	(-0.48)	(1.06)	(1.63)	(1.85)	(0.90)
ΔI	-1.563***	-3.235***	-1.711***	-1.446**	-1.753***	-1.910***	-1.558***	-3.324***
	(-5.38)	(-4.99)	(-4.04)	(-2.49)	(-5.85)	(-4.33)	(-4.89)	(-6.70)
ΔD	-0.402	3.330***	3.694***	0.643	1.598**	1.865**	1.126	2.699***
	(-0.40)	(6.38)	(4.09)	(0.73)	(2.08)	(2.16)	(1.17)	(4.60)
C	0.526***	0.330***	0.572***	0.371***	0.532***	0.398***	0.543***	0.357***
	(5.37)	(4.30)	(5.43)	(5.23)	(6.02)	(4.76)	(5.62)	(5.08)
L	-0.544***	-0.325***	-0.545***	-0.505***	-0.650***	-0.326***	-0.595***	-0.277***
	(-6.68)	(-6.36)	(-7.63)	(-6.10)	(-8.21)	(-5.35)	(-7.95)	(-3.79)
NF	0.054	-0.061	0.113*	-0.001	0.021	0.019	-0.006	0.172
	(1.22)	(-1.28)	(1.65)	(-0.03)	(0.46)	(0.28)	(-0.15)	(1.54)

ΔC_C	-1.115***	-0.661***	-1.084***	-0.673***	-0.968***	-1.013***	-0.979***	-1.011***
	(-8.05)	(-2.93)	(-7.37)	(-2.81)	(-5.68)	(-6.80)	(-6.42)	(-6.54)
ΔC_L	-2.188***	-1.263***	-2.066***	-2.168***	-2.454***	-1.642***	-2.174***	-1.601***
	(-9.82)	(-2.70)	(-6.30)	(-3.10)	(-8.94)	(-6.96)	(-10.24)	(-4.83)
INTERCEPT	0.016	-0.000	-0.018	0.087***	0.058***	0.002	0.059***	-0.017
	(0.83)	(-0.03)	(-1.07)	(4.55)	(3.94)	(0.14)	(3.89)	(-1.23)
N	30431	17493	17511	17493	32007	26237	40738	17551
R^2	0.240	0.146	0.228	0.188	0.234	0.207	0.232	0.197

Panel B: Using managerial ability ranking

	Payout Ratio		*Firm Size*		*Debt Rating*		*Paper Rating*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)	(t-stat)
ΔC	2.057***	1.121***	2.055***	1.812***	2.118***	1.766***	2.052***	1.721***
	(14.36)	(4.90)	(14.76)	(4.40)	(12.94)	(11.78)	(17.38)	(8.26)
ABILITY_RANKING	0.171***	0.047***	0.205***	-0.002	0.102***	0.120***	0.116***	0.107***
	(7.39)	(2.96)	(9.18)	(-0.08)	(4.20)	(5.58)	(4.68)	(5.43)
$\Delta C\_ABILITY$	0.591***	0.541**	0.381**	0.458*	0.341**	0.516***	0.359**	0.564***
	(4.19)	(2.04)	(2.32)	(1.68)	(2.43)	(3.07)	(2.43)	(3.88)
CONTROL VARIABLES	Included	Included	Included	Included	Included	Included	Included	Included
N	30431	17493	17511	17493	32007	26237	40738	17551
R^2	0.241	0.147	0.228	0.189	0.235	0.207	0.233	0.197

All variables are defined in Appendix A.
t-statistics are presented in parenthesis below the coefficients and are corrected for heteroskedasticity and cross-sectional and time-series correlation using a two-way cluster at the firm and year level.
*, **, *and* *** indicates significance levels at 10%, 5%, and 1%, respectively.

CHAPTER 6 CONCLUSION

The upper echelons theory in Hambrick and Mason (1984) theorizes that behavioral factors of managers have an influential impact on strategic decisions and organizational outcomes. Prior studies have documented that a significant part of the variation in firms' investment practices are explained by the unobserved manager fixed effects (Bertrand and Schoar 2003), managers' compensation levels are greatly affected by the manager-fixed effects (Graham et al. 2012), and higher ability CEOs improve financial reporting quality (Francis et al. 2008; Demerjian et al. 2013). Relying on the managerial ability measure developed by Demerjian et al. (2012), this study extends this stream of research by examining the association of CEO managerial ability with M&A quality, capital investment efficiency, and the value of cash. A CEO's managerial ability is reflected in his/her decisions and implementation on investment. With higher abilities to anticipate future changes in their firms' underlying economy, identify favorable investment opportunities to support the internal and external growth of their firms, and launch accurate and sufficient evaluation work, I predict that more able CEOs are more likely to conduct high quality M&As and make more efficient capital investment decisions. Further, given that the value of cash largely depends on the ways that CEOs use it, its availability, and the cost of external financing (e.g., Myers and Majluf 1984; Jensen 1986; Fazzari et al. 1988; Pinkowitz and Williamson 2004), I propose that shareholders will value cash more if a CEO is more capable of creating greater value out of cash by making better use of it (i.e., by engaging in efficient and quality investment activities).

Using four proxies, such as the market reaction to M&A announcements, the post-acquisition change in operating performance, the likelihood and magnitude of goodwill impairment in the post-acquisition period, and the probability of divestiture, to measure the quality of M&A decisions, I find that M&A conducted by higher ability CEOs are less likely to have goodwill impairment and divestitures in the post-acquisition periods. However, managerial ability score is shown to negatively relate to post-acquisition change in operating cash flow. In this sense, the prediction of the positive association between managerial ability and M&A quality is partially supported. With respect to capital investment efficiency, while investigating total capital investments, capital expenditures, R&D, and acquisition expenditures as proxies for investment, I find that when firms are most likely to under-invest, higher ability CEOs tend to increase the investment levels in R&D, acquisition expenditures, and total capital investments. On the other hand, when firms' likelihood of over-investing increases, higher ability CEOs tend to reduce the investment in acquisition expenditures and total capital investments. I find a similar pattern when using the abnormal levels of capital investments. These results together provide evidence that higher ability CEOs can improve investment efficiency when firms have a tendency to under-invest and/or over-invest, helping alleviate the prevalent agency problem. Finally, the analyses of the association between managerial ability and the value of cash support the prediction that cash is valued more when it is managed by more able CEOs. Overall, the results of this research provide evidence that managerial ability influences investment decision-making and the value of cash, in line with the notion that individual-level factors affect the investment practices and organization outcomes.

Future research can explore the causal link between managerial ability and investment efficiency. For example, one can investigate whether the mitigating effect of managerial ability

on under-investment is due to higher ability CEOs' better access to external funds. Finally, the risk preference of higher ability CEOs can also be an interesting research avenue to explore in the future.

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APPENDIX A

Variable Definitions

Variables	Definitions
Dependent Variables:	
3 days Abnormal Returns (*CAR*)	3-day, [-1,0,+1], cumulative abnormal return over M&A announcements. The abnormal return is measured through the market model;
Change in return on assets (*CHG_ROA*)	The average *ROA* over the years *t*+1 to *t*+3 minus the average *ROA* over the years *t*-3 to *t*-1, where year *t* is the acquisition year. *ROA* is the returns on assets, measured as income before extraordinary items divided by total assets;
Change in CFO (*CHG_CF*)	The average *CFO* over the years *t*+1 to *t*+3 minus the average *CFO* over the years *t*-3 to *t*-1, where year *t* is the acquisition year. *CFO* is operating cash flow, measured as cash flow from operations divided by total assets;
The Likelihood of Goodwill Impairment (*GOODWILL_DUM*)	A dummy variable equal to 1 (0) if a firm records (does not record) goodwill impairment losses in the three-year period following an acquisition that generates a large increase in goodwill. A large increase in goodwill is defined as an increase in goodwill greater or equal to 5% of total assets;
The Magnitude of Goodwill Impairment (*GOODWILL*)	The magnitude of goodwill impairment losses recorded in the 3-year period following an acquisition that generates a large increase in goodwill. A large increase in goodwill is defined as an increase in goodwill greater or equal to 5% of total assets;
The Possibility of Divestiture (*DIVESTITURE*)	A dummy variable equal to 1 (0) if an acquisition has (does not have) a subsequent divestiture during the 5 years following the acquisition. An acquisition is defined as having a following divestiture if the target acquired at the acquisition date has the same 4-digit SIC code as the firm divested during the 5-year post-acquisition period;
Total Capital Investment (*INVT_TOT*)	*INVT*=, the level of total capital investment, measured as the capital expenditure + research and development expenditure + acquisition expenditure - cash receipts from sale of property, plant, and equipment
Capital Expenditure	The level of capital expenditure;

(*CAPX*)	
Research and Development Expenditure (*R&D*)	The level of R&D expenditure;
Acquisition Expenditure (*ACQ*)	The level of acquisition expenditure;
Abnormal Total Capital Investment (*AB_TOT*)	The abnormal level of total capital investment, proxied by the residuals from the regression of a firm's total capital investment on lagged sales growth;
Abnormal Capital Expenditure (*AB_CAPX*)	The abnormal level of capital expenditure, proxied by the residuals from the regression of a firm's capital expenditure on lagged sales growth;
Abnormal Research and Development Expenditure (*AB_R&D*)	The abnormal level of R&D expenditure, proxied by the residuals from the regression of a firm's R&D expenditure on lagged sales growth;
Abnormal Acquisition Expenditure (*AB_ACQ*)	The abnormal level of acquisition expenditure, proxied by the residuals from the regression of a firm's acquisition expenditure on lagged sales growth;
Excess Stock Return *(EX_RET)*	A stock's excess return over the fiscal year - stock *i*'s return during fiscal year *t* (computed using monthly returns from CRSP) less the return of stock *i*'s size and book-to-market matched portfolio during fiscal year *t* constructed through the method in Fama and French (1993);
Variables of Interest:	
ABILITY_SCORE_AVG	3-year average managerial ability scores before a M&A;
ABILITY_SCORE_AVG	3-year average managerial ability rankings before a M&A;
ABILITY_SCORE	CEO managerial ability scores, continuous data;
ABILITY_RANKING	CEO managerial ability rankings, non-negative values.
Control Variables:	
Firm Size (*SIZE*)	Natural log of total assets;
Tobin's Q (*TOBINQ*)	Market value of equity plus book value of debts scaled by total assets;
Sales Growth (*GROWTH*)	Percentage change in sales in the fiscal year;
Returns on Assets (*ROA*)	Net income before extraordinary items and discontinued operations, scaled by lagged total assets;
Free cash flow (*FCF*)	Operating income before depreciation – interest expenses – income taxes – capital expenditures, deflated by lagged total assets;
Leverage (*LEVERAGE*)	The ratio of total liabilities to total assets;
Pre-acquisition stock return (*PRE_RET*)	Stock return over the period (-13,-1) month relative to the acquisition announcement;
Cash Payment (*Cash_DEAL*)	A dummy variable equal to 1 for purely cash-financed deals, and 0 otherwise;

Stock Payment (STOCK_DEAL)	A dummy variable equal to 1 for purely stock-financed deals, and 0 otherwise;
Public status of acquired firms (*PUBLIC*)	A dummy variable equal to 1 if the target is public traded, and 0 otherwise;
Diversifying Target (*DIVERSIFYING*)	A dummy variable equal to 1 if the target and the acquirer have different 2-digit SIC code, and 0 otherwise;
Country of acquired firms (*DOMESTIC*)	A dummy variable equal to 1 if the target is not a U.S. company, and 0 otherwise;
Relative deal size (*RELATIVE_SIZE*)	The ratio of the deal value to the acquirer's market value;
Number of bidders (*BIDDERS*)	A dummy variable equal to 1 if there is more than one bidder for the target firm, and 0 otherwise;
Diversifying M&A (*DIVERSIFYING*)	a dummy variable equal to 1 if the target and acquirer have different 2-digit SIC codes, and 0 otherwise;
E- Index (*E_INDEX*)	management entrenchment index, constructed according to Bebchuk et al. (2009), with higher index levels indicating stronger management entrenchment;
CEO/Chairman duality (*CEO_CHAIR*)	A dummy variable equal to 1 if the CEO is also the chair of the board, and 0 otherwise;
Equity-based Compensation Portion (*EQUITY_COMP*)	The percentage of equity compensation to total compensation, where equity compensation is a sum of options and stocks;
OVERI	A composite score measure created to indicate the likelihood of over-investment and under-investment based on the ranking of cash and leverage levels;
Market to Book ratio (*MTOB*)	The ratio of the market value of total assets to book value of total assets;
LOSS	A dummy variable equal to 1 if net income before extraordinary items is negative, and 0 otherwise;
Sales Volatility (*SALE_VOL*)	Standard deviation of the sales deflated by average total assets over previous 5 years;
Investment Volatility (*INVT_VOL*)	Standard deviation of investment over previous 5 years;
CFO_SALE	Operating cash flows divided by sales;
Operating Cash Flow Volatility (*CFO_VOL*)	Standard deviation of the cash flow from operations deflated by average total assets over previous 5 years;
SLACK	The ratio of cash to PPE;
Dividend (*DIV*)	A dummy variable equal to 1 if the firm paid dividends, and 0 otherwise;
Bankruptcy Risk (*ZSCORE*)	0.033*earnings before extraordinary item/total assets + sales/total assets + 0.014*retained earnings/total assets + 0.012*(working capital/total assets) + 0.006*(market value of common stock/total liabilities);
TANGIBILITY	PPE divided by total assets;
Capital Structure (*KSTRUCTURE*)	long-term debt divided by the sum of long-term debt and the market value of equity;

Industry Capital Structure (*IND_STRUCTURE*)	mean K-structure for firms in the same SIC3-digit industry;
ΔC	Change in cash and marketable securities;
ΔE	Change in earnings before extraordinary items;
ΔNA	Change in total assets excluding cash;
ΔRD	Change in R&D Expenses (0 if missing);
ΔI	Change in interest expenses;
ΔD	Change in common dividends distributed to common stock;
C	Cash and marketable securities;
L	Total debt divided by the sum of the book value of total debt and the market value of equity;
NF	New finance in year t, including net new equity issues and net new debt issues;
M	Market value of equity.

VITA

Ms. Huiqi Gan moved to the USA in 2009 and started to pursue her Ph.D. in Accounting in 2011 at Virginia Commonwealth University. She earned a BBA (Accounting) from the South China University of Technology and a Master in Accounting from University of Denver. Ms. Huiqi Gan has been in the accounting education for 10 years, and she conducts both archival research and behavioral research. Currently, Ms. Gan's scholarly research activities include the research in CEO compensation, corporate investment, earnings management, corporate governance, and whistle-blowing. During her study at the University of Denver and Virginia Commonwealth University, Ms. Gan received several academic wards in recognition of her academic excellence, such as Academic Leadership Award, Scholar Awards, Dean's Scholar, etc. Ms. Huiqi Gan has accepted a full time position as an Assistant Professor of Accounting at the University of Massachusetts, Lowell to begin in August 2015.