Winter 2012

Two Essays on Behavioral Finance

Quang Viet Vu
Old Dominion University

TWO ESSAYS ON BEHAVIORAL FINANCE

by

Quang Viet Vu

B.S. December 2000, Hochiminh University of Economics, Vietnam
M.S. May 2005, Hochiminh University of Economics, Vietnam

A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

BUSINESS ADMINISTRATION – FINANCE

OLD DOMINION UNIVERSITY

December 2012

Approved by:

Kenneth Yung (Director)

Mohammad Najand (Member)

David Selover (Member)

ABSTRACT

TWO ESSAYS ON BEHAVIORAL FINANCE

Quang Viet Vu
Old Dominion University, 2012
Director: Dr. Kenneth Yung

The first essay is entitled: "*CEO Overconfidence, Corporate Governance Practices and Firm Innovation*". In this study, I examine if overconfident CEOs overinvest or underinvest in innovative projects. I also investigate if overconfident CEOs pursue innovative projects to benefit personal interests or the interest of shareholders. By focusing on the effect of corporate governance in monitoring the behavior of overconfident CEOs, my results show that there is a negative relation between CEO overconfidence and firm innovation among firms with poor governance. In these cases, the finding is consistent with the implication that overconfident CEO are entrenched and invest inadequately in innovative projects when the firm has poor corporate governance. My results also show that for well-governanced firms, the overconfident CEOs do not overinvest because good risky projects are accepted and results in an increase in firm value. The other important result of my study is that well-governanced firms could influence the behavior of overconfident CEOs so that firm performance (measured by Tobin's q, ROA, and sales growth) is enhanced. On the other hand, it is also found that overconfident CEOs of poorly-governanced firms might pursue innovative projects so aggressively that projects with low expected payoff are accepted and results in poorer firm performance. These results add to the literature on managerial overconfidence by showing that the behavior of overconfident CEOs can be influenced and corporate governance could guide overconfident managers to invest selectively in good risky projects. In addition, my results offer insights into the puzzle why irrational managers are hired by showing that overconfident managers are hired because they could enhance firm performance if they were monitored by good governance practices.

The second essay is entitled "*Book-Tax Income Differences: a New Measure of Earnings Management*". In this study I develop a comprehensive measure that captures taxable income related earnings management in addition to the

conventional book income related accruals management. To confirm the adequacy of the new measure of earnings management developed in this study, I revisit several earnings management related issues previously investigated in the literature to see if the new measure performs better than conventional measures. The issues I re-examine include:

1. Executive stock option exercises - Insiders have incentives to use private information about forthcoming earnings to time their stock option exercises. Conflicting results have been documented by Bartov (2004), Efendi (2007) and Armstrong et al. (2009). My new measure that captures both income tax related and book income related earnings management may provide better insights. My results also show that executives time their stock option exercises regardless of the source of earnings management.
2. Firm credit ratings – Earnings management has led to downward revisions of firm credit ratings because credit analysts are able to see through the information content of earnings management (Ayers et al. 2009). The book-tax earnings management measure I develop can provide additional information to credit analysts. My results show that credit analysts react favorably to tax savings associated with tax planning activity when other information is obscured by earnings management.
3. Firm Value and earnings management - Outside investors are in general unable to fully comprehend the information underlying earnings management. The new book-tax earnings management measure I develop may help investors respond more correctly as the measure incorporates more information. My results show that once investors decipher the information of earnings management, they correct their errors in the following time periods.

This dissertation is lovingly dedicated to my family. Thank you for all of your support, encouragement and sacrifice throughout my life.

ACKNOWLEDGMENTS

I would like to express my deepest gratitude to the following people who contributed to the successful completion of this dissertation:

First, I would like to thank my advisor and director of my committee, Dr. Kenneth Yung, for his patient guidance of my research and hours of editing this manuscript. Without such great help I may have not have been able to complete my dissertation. His diligent efforts deserve special recognition. I also would like to thank Dr. Mohammad Najand, who taught me the SAS technique. This knowledge has been the foundation of my empirical analysis skills for doing research in the field of finance. I am also grateful for his support of my desire to teach here in the US, helping me to significantly improve my teaching skills and classroom experiences. I would also like to thank Dr. David Selover for teaching and helping me develop my background in Econometrics as well as his helpful comments that made improvement on my dissertation. Special thanks also go to Dr. John Doukas who taught me a lot of things in Finance, which inspired me in the PhD program.

I would also like to express my profound gratitude to Katrina Davenport, administrative manager of PhD program; Dr. John Ford, director of the PhD program; and Dr. Sylvia Hudgins, ex PhD Director, for their great assistance throughout my study years.

Also this accomplishment would have never been achieved without the endless unconditional support and encouragement from my mother, elder brother, elder sister and my wife. They always stood by me with their best wishes, recognizing the tough challenges and obstacles I was facing in the PhD program. .

Finally, I am also much indebted to all of my colleagues and friends in Vietnam, my home country, as well as friends at ODU for their encouragement and help.

TABLE OF CONTENTS

LIST OF TABLES

ESSAY 1

ESSAY 1

CEO OVERCONFIDENCE, CORPORATE GOVERNANCE PRACTICES AND FIRM INNOVATION

1.1 INTRODUCTION

As today's business environments become more complex and challenging, the manager is confronted with the demanding task of making tough decisions regularly. To make effective decisions in such an environment, the manager must have significant skills and important attributes, including a high-level of self-confidence. According to Jack Welch, the former CEO of General Electric, self-confidence and courage are required for a manager to "pick the bets, put the resources behind them, articulate the vision to the employees, and explain why he said yes to this one and no to that one." That is, decision making may involve more than logic and sophisticated analyses.

Self-confidence is a complicated concept that has often been compared to related ideas such as self-efficacy, self-esteem, self-satisfaction, self-worth, self-respect, or self-acceptance (Tharenou 1979). In the business environment, a self-confident manager is one who is willing to make what are often very complicated and tough decisions. The willingness of the manager in decision making depends on his belief in his capabilities and effectiveness as a decision maker. However, the manager, like most people, exhibits varying levels of self-confidence. Some managers are more likely to produce decisions that are relatively free of risk because of their lack of self-confidence; other managers may prefer decisions that have risky outcomes due to their high levels of self-confidence. In psychology literature, people with high levels of self-confidence are also deemed overconfident. It is found that overconfident persons typically overestimate their abilities and overestimate the accuracy of their knowledge (Taylor and Brown 1988; Braumeister 1998). Psychologists have provided significant evidence that people tend to be overconfident (Kidd 1970; Moore 1977). For example, drivers overestimate their

driving skills, students their scores in examinations, and gamblers their odds in card games. Overconfidence also has significant impacts on managerial behavior. Weinstein (1980) find that overconfident CEOs underestimate the probability of failure and are overoptimistic about the future. However, overconfidence is not necessarily bad for the firm. Bandura (1986) argues that overconfidence promotes self-efficacy and accentuates the willingness to face challenges. It has also been observed that overconfidence is associated with the willingness to explore and the readiness to assume risk (Bernardo and Welch 2001; Goel and Thakor 2008).

In recent years, the relation between overconfident CEOs and firm behavior has received much attention from researchers. There is evidence that managerial overconfidence is associated with corporate investment distortions (Malmendier and Tate 2005), value-destroying mergers (Malmendier and Tate 2008), debt conservatism (Malmendier et al. 2007), or excess entry in a market (Camerer and Lovallo 1999). A recent strand of research has examined the effect of managerial overconfidence on firm innovation. Galasso and Simcoe (2010) and Hirshleifer, Low and Teoh (2010) reach the same conclusion that firms with overconfident CEOs invest more in innovation. Despite Hirshleifer et al. (2010) find that overconfidence is not associated with a decline in firm value; they find mixed evidence regarding the effect of overconfident CEOs in improving firm value.

In this study, I extend the works of Galasso and Simcoe (2010) and Hirshleifer et al. (2010). Several concerns motivate my investigation. First, existing studies have documented a positive relation between CEO overconfidence and firm innovation, but it is unclear whether overconfident CEOs overinvest in innovative projects. Second, based on the mixed result of Hirschleifer et al. (2010) on the relation between firm performance and firm innovation, the literature has yet to determine if overconfident CEOs innovate to benefit self-interests or the interest of shareholders. Third, is it possible to influence the behavior of overconfident CEOs so that they accept good but risky projects mainly? Based on these three just-mentioned concerns, I conduct the current study to achieve the following objectives. My first objective is to determine whether overconfident CEOs overinvest or underinvest in innovative projects. Overconfidence is not an agency problem (Rolls

1986). Thus, excessive investments by overconfident CEOs in innovative projects should not be viewed as overinvestments from an agency perspective. The first objective of my study is, however, directly related to two statements made by Hirshleifer et al. (2010). First, the authors mention that overconfident managers who pursue innovative projects aggressively may undertake projects with low expected payoff. Then they further mention that overconfident mangers can potentially achieve higher average innovative productivity by accepting good but risky projects. Based on these statements, I examine the influence of corporate governance on the relation between CEO overconfidence and innovation. Kolasinksi and Li (2012) find that CEO overconfidence could be attenuated by the presence of a strong corporate board. Thus, I argue that firms with good governance practices can monitor overconfident CEOs to the extent that they invest primarily in good but risky projects. The positive relation between CEO overconfidence and firm innovation for well-governanced firms, however, does not imply excessive investments because good innovative projects are beneficial to shareholders. On the other hand, I also argue that for poorly-governanced firms, the relation between CEO overconfidence and firm innovation could be either positive or negative. The reason is that CEOs are less effectively monitored when corporate governance practices are poor, thus the overconfident CEO may pursue innovative projects so aggressively that projects with low expected payoff are accepted. In such cases, a positive relation between CEO overconfidence and firm innovation is consistent with the implication that the firm has invested excessively (overinvest) in innovative projects. If the relation between CEO overconfidence and firm innovation is negative for poorly-governanced firms, then it is consistent with implications that entrenchment effects dominate the influence of CEO overconfidence and less than optimal innovative projects are pursued. In short, poorly-governanced firms may either overinvest (invest too much) or underinvest (invest inadequately) in innovation.

My second objective in this study is to determine whether overconfident CEOs invest in innovative projects to enhance personal interests or firm value. Based on the finding of Kolasinksi and Li (2012) and the ample evidence in the literature that firms with good corporate governance are less likely to invest in value-decreasing projects, I argue that for firms with good corporate governance practices

the investment in innovative projects by overconfident CEOs is for promoting the wealth of shareholders. On the other hand, for firms with poor governance practices, overconfident CEOs may pursue innovative projects so aggressively that even firm-value decreasing investments are accepted. In such cases, the observation is consistent with implications that the overconfident CEO is more interested in achieving personal satisfaction than protecting the interest of shareholders.

My results show a positive relation between CEO overconfidence and firm innovation for firms that have good governance practices. For these well-governanced firms, the overconfident CEOs do not overinvest because it is likely that good innovative projects, despite risky, are accepted. My results also show that there is a negative relation between CEO overconfidence and firm innovation among firms with poor governance. In these cases, the finding is consistent with the implication that entrenchment effects dominate the effect of CEO overconfidence and the firm invests inadequately in innovative projects. The other important result of my study is that well-governanced firms could influence the behavior of overconfident CEOs to the extent that firm performance is enhanced. On the other hand, it is also found that overconfident CEOs of poorly-governanced firms might pursue innovative projects so aggressively that projects with low expected payoff are accepted and results in poorer firm performance.

My work contributes to three lines of research. First, my results add to the literature on managerial overconfidence by showing that the behavior of overconfident CEOs can be influenced. My finding is consistent with the result of Kolasinksi and Li (2012) that good corporate governance practices can attenuate the errors of overconfident CEOs. Second, I expand the literature on corporate innovation by showing how corporate governance plays a significant role in monitoring investment activity in innovative projects by overconfident CEOs. My result shows that corporate governance could guide (encourage) overconfident managers to invest selectively in good risky (i.e. value-enhancing) projects. My finding supports the conclusion of John, Litov, and Yeung (2008) that good corporate governance promotes value-increasing risk-taking behavior. In addition, my results offer insights into the puzzle why irrational managers are hired. Hirshleifer et al

(2010) argue that overconfident CEOs are hired because they are better innovators. Galasso and Simcoe (2010) suggest that overconfident CEOs are hired because they may be more capable in guiding the firm to make strategic changes. I add to the arguments by showing that overconfident managers are hired because they could enhance firm performance if they were monitored by good governance practices.

1.2 LITERATURE

This study is built on several lines of research that include the examination of the psychology of overconfidence, investigations on irrational managerial behavior, studies of corporate risk-taking behavior, and inquires of the impact of corporate governance on firm behavior.

1.2.1 Literature on the psychology of overconfidence

Psychologists have extensively investigated the phenomenon of overconfidence and reached the consensus that most people are overconfident. That is, people tend to overestimate their abilities and underestimate the probability of failure (Miller and Rose 1975). For example, Svenson (1981) reports that about 80% of drivers believe they have better driving skills than the average driver. Langer (1975) finds that overconfident persons believe they have more control of the outcome if they personally throw a dice than if someone else does it. Weinstein (1980) shows that most CEOs believe the investment projects chosen by them personally have a lower chance of failure. A number of studies indicate that overconfidence is associated with significant advantages in decision making. For example, Bandura (1986) finds that people tend to avoid tasks and situations. Their belief exceed their capabilities, but they undertake and perform assuredly activities they judge themselves capable of performing. Taylor and Brown (1994) are among the proponents of the hypothesis that overconfidence is both normal and adaptive. They argue that overconfidence can serve a wide range of cognitive, affective, and social functions. In a recent study, Ludwig, Wichardt, and Wickhorst (2011) show in

a theoretical model that overconfidence can improve a person's relative and absolute performance in contests compared to an unbiased person.

The more recent psychology literature argues that there are several distinct forms of overconfidence. Moore and Healy (2008) distinguish between overestimation (of own ability and performance), overplacement (that is, the belief to be better than others), and overprecision (that is, excessive certainty about the accuracy of one's belief). Hilton, Regner, Cabantous, Charalambides, and Vautier (2011) differentiate between judgmental overconfidence (overestimating the precision of one's judgments), self-enhancement biases (positive self-illusions such as better-than-average effect and the illusion of control), and optimism with respect to societal task. Among all these different dimensions, judgmental overconfidence and self-enhancement biases are important to financial economists because corporate decisions involve frequent dealings with uncertainty and risk and such situations are more likely affected by CEOs exhibiting traits of overconfidence.

1.2.2 Literature on irrational managerial behavior

For decades, rationality is the foundation of mainstream models and theories of firm behavior. Financial economists have typically assumed that mangers behavior rationally with the objective of maximizing the wealth of shareholders in managing corporate affairs. In recent years, many researchers have started producing empirical evidence that irrational managerial biases also affect firm behavior significantly. Daniel Kahneman, the 2002 Noble Laureate in economics, is a pioneer in decision-making theory whose insights contribute significantly to the understanding of irrational human behavior. Kahneman and Tversky (1979) introduce the prospect theory that accounts for a number of systematic biases in irrational managerial behavior. The following is a brief introduction of several irrational managerial biases that are related to the prospect theory:

a. Loss Aversion

It is argued that there is asymmetry between perceived gains and losses. Psychologists have demonstrated in a number of experiments that participants are

about twice more likely to avoid losses than favor gains. That is, individuals consider losses larger than equal-size gains; and individuals on average have an incentive to avoid losses. Consistent with this observation, Odean (1998) find evidence that investors hold on to their losing stocks too long but sell their winning stocks too soon. In the corporate arena, loss aversion implies the incentive to throw good money after bad money. Shefrin (2001) and Shimizu and Hitt (2005) observe that many firms retained money-losing business units for extended time periods without divesting them. Guedj and Scharfstein (2008) study the pharmaceutical industry and find that single-product early stage firms are reluctant to abandon their drugs even though the clinical results are not promising.

b. Risk seeking

Another prediction of the prospect theory is the irrational risk-seeking behavior of individuals. It is posited that individuals will take irrational risks when the alternative is a certain loss. The underlying argument is that the loss aversion sentiment is so strong that individuals strongly prefer risks that might mitigate a loss. A likely scenario is when a project has a certain but small loss, the manager prefers an alternate project that has a large potential payoff but with a high risk of failure. The bias toward potentially larger payoffs distorts managerial decisions. An example of risk seeking is reported by Wall Street Journal on March 29, 2007 regarding the CEO of Royal Dutch Shell PLC. It was reported by Wall Street Journal that after the new CEO joined the firm, he made changes to the board that essentially gave him control of the entire company. The new CEO guided the firm to invest in very risky adventures in Middle East and remote Russia instead of focusing on traditional less-risky projects in developed countries.

c. Reference-Point Preferences

In the prospect theory, satisfaction is defined not in terms of the level of wealth or consumption but in terms of changes relative to a reference level. For example, using purchase price as a reference point, stock investors hesitate to sell at a loss despite there are compelling reasons doing so. The reference-point bias also has impacts on irrational firm behavior related to earnings management,

mergers and acquisitions, lending and borrowing arrangements. It is well documented in the literature that firms manage earnings to meet or exceed important reference points such as positive earnings, past reported earnings, and analysts' expectations (Burgsthaler and Dichev 1997; Degeorge, Patel, and Zeckhauser 1999). The phenomenon is found to have existed in both developed and developing economies (Leuz, Nanda, and Wysocki 2003; Defond, Hung, and Trezevant 2006). It is also found in the literature that acquiring firms use recent price peaks of target firms as reference points in determining the acquisition price of the target (Baker, Pan, and Wurgler 2011). The authors document that there is a spike in the distribution of offer prices at the target's 52-week high and other historical peaks. It is, however, argued by some researchers that the acquisition price of the target in mergers and acquisitions is sometimes overvalued (Shleifer and Vishny 2003; Rhodes-Kropf, Robinson, and Viswanathan 2005; Dong, Hirshleifer, Richardson, and Teoh 2005). The reference-point bias also exists in lending and borrowing practices among firms. That is, borrowers and lenders use past credit terms as reference points for current arrangements. Dougal, Engelberg, Parsons, and Van Wesep (2011) find that current borrowing costs are significantly related to historical costs. The authors report that the borrowing cost on loans taken out during the 2005 and 2007 time period is hardly affected by the 2008 financial crisis. For the borrowers that did not suffer a decline in credit rating, about 1/3 borrowed at the same rate as before the crisis. In addition, reference-point biases have been found to exert influences on dividend policies, equity issuance decisions, and debt financing arrangements.

d. Escalation of commitment

Another likely outcome of loss aversion is the tendency not to abandon an investment project despite mounting evidence that the action is not rational. Staw and Ross (1989) find that managers allocate more resources to an investment project when there is evidence that the project is failing than when the project is succeeding. Schmidt and Calantone (2002) also report that managers tend to keep pumping resources in failing projects that were started by them than admitting failure. The literature has numerous examples of 'runaway' investments that persist

and continue to receive funding despite the action is not justified by simple cost-benefits analysis (Nulden 1996). Very often, escalation of commitment results in misallocations of corporate resources and makes related managerial behavior unexplainable from a rationality perspective.

e. Overconfidence

Managerial overconfidence has been investigated extensively in extant literature. Malmendier and Tate (2003) report evidence of such a behavioral bias that overconfident CEOs retain significant amounts of cash for investment activity than distributing cash dividends to shareholders. It is argued that overconfident CEOs overestimate their ability and frequently end up investing in projects that should have been avoided. There is evidence that managerial overconfidence is associated with many types of corporate investment distortions (Malmendier and Tate 2005), value-destroying mergers (Malmendier and Tate 2008), debt conservatism (Malmendier et al. 2007), or excess entry in a market (Camerer and Lovallo 1999). A real life example is the CEO of Quaker, who after successfully acquired Gatorade and turned it into a big success, became overconfident and went on to acquire Snapple. The acquisition eventually became a big disaster for the firm. A recent strand of research has examined the effect of managerial overconfidence on firm innovation. Galasso and Simcoe (2010) and Hirshleifer, Low and Teoh (2010) reach the same conclusion that firms with overconfident CEOs invest more in innovative projects. Despite Hirshleifer et al. (2010) find that overconfidence is not associated with a decline in firm value; they find mixed evidence regarding the effect of overconfident CEOs in improving firm value.

The literature review presented above indicates the significance of irrational managerial behavior in the corporate sector. The mounting evidence of behavioral biases has cast significant doubts on the assumption of rationality in conventional financial theories. In recent years, the research on behavioral corporate finance has drawn the attention of scholars and practitioners. Behavioral approaches complement traditional financial theories in offering intuitive and convincing explanations for many corporate phenomena that are unexplainable by traditional paradigms.

1.2.3 Literature on corporate governance

Corporate governance consists of mechanisms to ensure that agency problems between shareholders and managers or between majority and minority shareholders are controlled or resolved, with the objective to ensure that suppliers of finance to corporations will get a return on their investment (Shleifer and Vishny 1997). The research on corporate governance is voluminous. Corporate governance may involve the following mechanisms:

i. Compensation schemes that align the interests of managers and owners. In general, it is argued that stock and option based compensation schemes can motivate managers to maximize firm value.

ii. A board structure that includes independent directors to monitor the manager's discretional behavior. When the CEO is also the chairman of the board, corporate governance is bad because excessive power is concentrated in the hands of the CEO.

iii. Corporate bylaws that protect shareholder rights. For example, bylaws that guarantees mandatory dividend and/or proxy voting by mail. Bylaws that prevent the firm from adopting antitakeover provisions enable corporate raiders to protect the rights of shareholders by imposing controls on managers who are not interested in enhancing firm value.

iv. An ownership structure that encourages monitoring of managerial behavior. For example, the presence of institutional owners or large outside shareholders may exert pressure in controlling undesirable actions of the manager. Dual-class equity is considered a bad governance practice as the ownership structure concentrates excessive voting power in a small number of shareholders.

1.2.4 Literature on risk-taking behavior of firms and the influence of corporate governance

Many individuals assume risks for psychological satisfaction, but in the business sector the willingness to assume risk frequently reflects the desire to

pursue profitable opportunities. The relation between risk taking and pecuniary motives is quite straight forward when the business owner is also the manager. However, the separation of ownership and control in the corporate sector has made managerial risk-taking behavior a complicated issue. Manager-owner agency problems arise when managers' interests diverge from those of shareholders, resulting in lower firm values (Berle and Means 1932; Jensen and Meckling 1976).

Risk taking is predominantly manifested in corporate investment activity. The literature on the relation between agency conflicts and corporate investment is voluminous despite the predictions from this literature are not necessarily unanimous. Whether under- or overinvestment occurs as agency conflicts become more significant is still a debatable topic. Among the various viewpoints supporting the underinvestment outcome, some posit that managers underinvest because they cannot fully diversify the risk of firm-specific human capital (Amihud and Lev 1981). Some researchers argue that underinvestment occurs when investment performance affects the reputation of the manager's ability (Hirschleifer and Thakor 1992); others argue that underinvestment occurs because managers have a limited payout horizon (Smith and watts 1992). On the other hand, many have argued that managers have incentives to overinvest because of personal benefits (Jensen 1986, 1993; Stulz 1990; Hart 1995). There is significant evidence in the literature that some managers are empire builders to the extent that negative net present value projects are accepted.

It has been argued that agency conflicts can be reduced when corporate governance measures are used to align managerial interests with those of the owner (Jensen and Murphy 1990; Downs and Summer 1999). The literature, however, provides opposite views on how corporate governance affects managerial risk-taking activities. On one hand, some argue that antitakeover provisions protect managers from market disciplines and promote their incentives to overinvest (Jensen and Ruback 1983; Shleifer and Vishny 1986). Gompers et al. (2003) find that firms with weak governance are associated with higher levels of capital expenditures. Some researchers report find that proper shareholder rights protection make other stakeholders such as creditors and labor groups less effective in reducing

managerial risk-taking (Morck and Nakamura 1999; Tirole 2001). Acharya et al. (2009) report similar evidence by showing that higher shareholder protection induces more focus-increasing acquisitions. Opposite to the view that corporate governance mechanisms may lead to overinvestment, some posit that antitakeover provisions increase managerial slacks and weaken the incentive to invest (Giroud and Mueller 2010).

Some studies specifically focus on the effect on corporate governance on the manager's willingness to assume long-term risks such as R&D investments. DeAngelo and Rice (1983) and Stein (1988) argue that antitakeover provisions reduce managerial myopia and encourage managers to invest in projects that have long-term payoffs without having to worry about job security associated with takeovers. Harris (1990) stipulates that golden parachutes allow firm managers to invest in long-term specialized projects that may not be marketable to other companies. Similarly, Coles et al. (2009) use board co-option as an indicator of CEO entrenchment and find evidence that R&D intensity is positively related to board co-option. The common implication underlying these studies is that entrenched managers are more likely to accept long-term risky projects such as R&D investments. On the other hand, some argue that managers focus on extraction of private benefits when corporate governance is poor, resulting in extreme risk aversion (Morck et al. 2005; Stulz 2005).

The effect of corporate governance on firm performance is less than straight forward. An extensive empirical research has documented that firms with strong corporate governance mechanisms are in general associated with better firm performance, higher stock returns and higher firm valuation (Core et al. 2006; Bhagat and Bolton 2008; Bebchuk et al. 2009; Ammann et al. 2011). However, a growing number of studies question the positive relation between corporate governance and firm performance. For example, Core, Guay and Rusticus (2006) argue that the results by Gompers et al. (2003) are driven by the impact of technology firms on the disparities in the stock prices in the 1990s. Ferreira and Laux (2007) find that firms with a better governance measure based on the G-index of Gompers et al. are riskier firms and that explains why firms with good corporate

governance have higher returns. Some researchers do not find empirical evidence of a significant positive relation between corporate governance and stock performance (Firth, Rui, and Fung 2002; Pham, Suchard, and Zein 2007). Aman and Nguyen (2007) find that firms with poor governance have better market performance than firms with good governance in Japan. In sum, the effect of corporate governance appears to be stronger on firm value (Tobin's Q) but less strong for operating performance and stock returns. It has been argued that the conflicting evidence in the literature on the relation between firm performance and corporate governance is due to endogeneity problems (Himmelberg, Hubbard, and Palia 1999; Coles, Lemmon and Meschke 2003). For example, more capable managers are attracted to firms with better governance structures.

1.3 MOTIVATIONS AND HYPOTHESES

1.3.1 Motivation 1: existing studies have not yet investigated how corporate governance affects the relation between overconfident CEOs and firm innovation

Innovations that develop new technologies and seek to provide new products or services are important for firms to succeed in competitive markets. Some researchers have investigated how firm innovation is affected by CEO overconfidence (Galasso and Simcoe 2010; Hirshleifer et al. 2010) while many have examined how corporate governance is related to corporate research and development investments (Honore and Florence 2010; Munari et al. 2010; Aghion et al. 2009). Despite it has been found that overconfident CEOs invest more in innovative projects, the impact of corporate governance on the relation has not been examined yet.

Some researchers of the relation between corporate governance and firm R&D intensity argue that, according to the agency theory, managers might under-invest in innovative projects because of risks to human capital and career concerns (Fama 1980; Ahimud and Lev 199; Zwiebel 1995). In addition, some argue that

managers focus on extraction of private benefits when corporate governance is poor, resulting in extreme risk aversion (Morck et al. 2005; Stulz 2005). Studies of cross-country comparisons have also made similar suggestions that weak corporate governance reduces risk-taking incentives of managers (John, Litov, and Yeung 2008). Lhuillery (2011) also finds that entrenched managers have less incentive to invest. In short, many have opined that poor governance has a negative impact on high-risk adventures such as R&D investments.

In contrast to the view just presented, those who propose the growth-argument suggest that managers have incentives to over-invest in R&D because the size of personal benefits is positively correlated with company size (Baker et al.1988). It is argued that managers also have non-monetary incentives to assume risk by overinvesting in R&D in order to obtain power and prestige at the cost of shareholders. DeAngelo and Rice (1983) and Stein (1988) argue that antitakeover provisions reduce managerial myopia and encourage managers to invest in projects that have long-term payoffs without having to worry about job security associated with takeovers. Harris (1990) stipulates that golden parachutes allow firm managers to invest in long-term specialized projects that may not be marketable to other companies. Similarly, Coles et al. (2009) use board co-option as an indicator of CEO entrenchment and find evidence that R&D intensity is positively related to board co-option. Thus, this line of research suggests that poor corporate governance is likely to have a positive effect on R&D investments.

Despite the above evidence that poor corporate governance might have opposite effects on the risk-taking incentive of CEOs, John et al. (2008) find that good governance practices lead firms to undertake riskier but value-enhancing investments. Honore (2010) examines a sample of French corporations and finds evidence that firms with comprehensive shareholder governance practices are relatively more R&D intensive. A larger number of earlier studies also find that good shareholder rights protection is associated with higher levels of corporate risk-taking (e.g., Hirshleifer and Thakor 1992; La Porta et al. 1999; Shleifer and Wolfenzon 2002). Thus I develop the follow hypothesis linking the effect of corporate

governance on the relation between overconfident CEOs and investment in innovation projects.

Hypothesis 1: Firms with better corporate governance practices have a positive relation between CEO overconfidence and firm innovation.

1.3.2 Motivation 2: Why do firms hire irrational managers who are overconfident?

The assumption of rational behavior has been the foundation stone of behavioral models for decades. In finance literature, it is assumed that managers act rationally to protect and maximize the value of the firm. Thus, the presence of overconfident managers is a puzzle to researchers. Hirshleifer et al. (2010) provide an answer to the puzzle by showing that overconfident CEOs are better innovators. Galasso and Simcoe (2010) furnish another answer by suggesting that overconfident CEOs might be more capable to lead a change in the firm's direction, particularly in competitive industries. I propose here another reason that firms hire overconfident CEOs because overconfident CEOs can improve firm performance when monitored by good corporate governance. Hirschleifer et al (2010) suggest that overconfident managers who pursue innovation aggressively may undertake projects with low expected payoff. The authors also suggest that overconfident managers can potentially achieve higher average innovative productivity by accepting good but risky projects. I extend the argument of Hirshleifer et al. by suggesting that firms with good corporate governance can monitor overconfident CEOs to the extent that they incline to accept good risky projects only. That is, firms hire overconfident CEOs because they can be monitored by governance measures to improve firm performance. My argument is consistent with the findings of many researchers that firm performance positively related to corporate governance practices (see survey of the literature by Bebchuk and Weisbach 2011). In addition, my suggestion is supported by the finding of Kolasinki and Li (2010) that the behavior of overconfident managers could be monitored. Kolasinki and Li find that small boards dominated by independent directors reduce the impact of CEO overconfidence on acquisition frequency. Thus, I develop the following hypotheses:

Hypothesis 2: Firms with good corporate governance practices have better performance measures as overconfident CEOs are monitored to accept good but risky innovative projects on average.

1.4 DATA AND METHODOLOGY

1.4.1 The Sample

I use several databases including the Standard and Poor's Execucomp, Compustat, and NBER patent files to construct the sample. The sample period ends in 2006 because the NBER data files provide patent information up to this year only. Besides, publicly available corporate governance indicators such as G-index (Gompers et al. 2003) and E-index (Bebchuk et al 2005) also stop in 2006. The Execucomp database provides information on executive compensation and some personal characteristics. Following Malmendier and Tate (2005a, b) I use the data on option compensation to construct an indicator measuring CEO overconfidence. All the accounting data are obtained from Compustat. Patent-related data are from the 2006 edition of the NBER patent database. The E and G indexes are obtained from the websites of professor Bebchuck and professor Metrick, respectively.

To be included in the sample, a firm is required to have a market value greater than 100 million dollars. Financial firms with 2-digit SIC codes from 60 to 69 and utility companies with 2-digit SICs from 40 to 49 are excluded from the study. It is required that each sampled firm must have data in the patent database and compensation data are available to calculate the measure of CEO overconfidence. Firms with missing data on control variables and dependent variables are deleted. The initial sample includes more than 62,000 firm-year observations, but the final sample consists of only 1,729 firm-year observations between 1999 and 2006. Without including corporate governance measures in their study, Galasso and Simcoe (2010) have a sample size of 3648 firm-year observations from 1980 to 1994, but only 1512 firm-year observations have data for an options-based measure (which I also use in this study) of CEO overconfidence. My sample size, after

requiring the availability of G-index and E-index, is therefore comparable to that of Galasso and Simcore.

1.4.2 Measuring firm innovation

Many researchers use patent count and citation count as measures of innovation. However, Griliches, Pakes, and Hall (1987) show that simple patent counts capture innovation success imperfectly because innovations vary widely in terms of significance. Sometimes, patents are granted despite the innovation may have zero impact on firm value. Trajtenberg (1990) and Hall, Jaffe, and Trajtenberg (2005) show that citation count is a better indicator of innovation as it shows better correlations with measures of firm value. Therefore the measure of firm innovation used in this study is total citation count. Following Galasso and Simcoe (2010) and Hisrhelifer et al. (2010), citation count is measured as the number of total citations summed across all patents applied for during the year and multiplied by a weighting index from Hall, Jaffe, and Trajtenberg (2001, 2005). Data for patent citations are constructed using the 2006 edition of the NBER patent database (Hall et al., 2001). The database covers over 3.2 million patent grants and 23.6 million patent citations from 1976 to 2006 and contains information about patent assignee names and their Compustat-matched identifiers, the number of citations received by each patent, etc. Patents are included in the database only if they are eventually granted. Given that there is on average a two-year lag between patent application and patent grant, patents applied for in 2004 and 2005 may not appear in the 2006 database. In my data collection process, I also follow Bessen (2009) in matching patent data to Compustat data given that patent ownership sometimes changes.

1.4.3 Measuring CEO Overconfidence

Extant literature identifies overconfident CEOs as those who deliberately over-expose their personal wealth to the idiosyncratic risk of their firms (Lambert, Larcker, and Verrecchia 1991; Meulbroek 2001; Hall and Murphy 2002). Following Malmendier and Tate (2005a and 2008), a CEO is considered overconfident once he postpones exercising vested options that are at least 67% in the money. The threshold of 67% is based on a calculation of Hall and Murphy (2002) that suggests

a failure to exercise an option that is 67% in the money implies a constant relative risk-aversion of three. Given that I do not have detailed data on CEO options holdings and the exercise price of each granted option, I follow Hirshleifer et al. (2010) and Campbell et al. (2009) in calculating an average moneyness of the CEO's option portfolio for each year. First, for each CEO-year, the average realizable value per option is calculated by dividing the total realizable value of the options (ExecuComp variable OPT_UNEX_EXER_EST_VAL) by the number of options held by the CEO (ExecuComp variable OPT_UNEX_EXER_NUM). The strike price is calculated as the fiscal year end stock price minus the average realizable value. The average moneyness of the options is equal to the stock price divided by the estimated strike price minus 1. In these computations, only the vested options are included. I create (01) dummy variable (OverCEO) that has a value of one if the CEO's average amount of profit per share is greater than 0.67 or in another word the CEO is identified as overconfident, and zero otherwise. Similar to Hirshleifer et al. (2010), the overconfidence measure of a CEO remains unchanged over the sample period because the personality trait is considered persistent.

1.4.4 Measuring market competition

The impact of competition on innovation is well documented in the literature. It is generally believed that competition forces firms to allocate resources more efficiently. It is also a common belief that competition results in downward pressure on costs, decreases slack, provides incentives for the efficient organization of production, and even promotes innovation. Geroski (1990) find evidence that concentration and other measures of monopoly power tend to reduce the rate of innovation. Caves and Barton (1990), Green and Mayes (1991) and Caves et al. (1992) find that an increase in market concentration above a certain threshold tends to reduce technical efficiency. In contrast, a number of studies report a negative relationship between competition and innovation (Schumpeter 1943; Nickell 1996; Blundell et al. 1999). Scherer (1967) discovers a significant inverted-U shape relationship between the two. Based on these findings, I also control for the effect of competition on firm innovation. Following Nickell (1996) and Hirshleifer (2010), the indicator of product market competition is developed from the Lerner Index, or price

cost margin. According to Aghion (2006; 2009) this measure has several advantages over conventional measures such as market share or the Herfindahl concentration index. Price cost margin is the difference between operating profits net of depreciation and an estimated financial cost of capital, scaled by sales. The cost of capital is assumed to be 0.085 for all firms and time periods and the capital stock (Aghion 2006 and 2009).

$$Competition_{i,t} = \frac{Operating\ profit - financial\ cost}{Sales}$$

The competition measure is then computed using the following equation,

$$Competition_{j,t} = 1 - \frac{1}{N_{j,t}} \sum_{i=0}^{k} Competition_{i,t}$$

where i indexes firms, j indexes industry, t indexes time, and N_{jt} is the number of firms in industry j in year t. A value of 1 indicates perfect competition (price equals marginal cost) while values below 1 indicate some degree of market power. In computing the competition index, I use the entire sample of public firms in each industry, not only those in the NBER patent subsample.

1.4.5 Measuring corporate governance

Corporate governance mechanisms frequently exist simultaneously within the firm and are thus often synthesized and measured by aggregate indexes in the literature (La Porta et al. 1998; Gompers et al. 2003; Bebchuk et al. 2005). The commonly used indexes include the G_index of Gompers et al. (2003) and the E_index of Bebchuk et al. (2005). The G_index is constructed based on a set of 24 provisions that are classified into the following five groups: tactics for delaying hostile bidders (*Delay*); voting rights (*Voting*); director/officer protection (*Protection*); other takeover defenses (*Other*); and state laws (*State*). For every firm, one point is added for every provision that reduces shareholder rights. Therefore, firms with higher G_index scores are referred to as having the "highest management power" or the "weakest shareholder rights" and vice versa.

The E_index of Bebchuk et al. (2005) is an entrenchment index which is constructed based on six provisions. Four of them involve constitutional limitations on shareholders' voting power. The other two provisions can be regarded as "takeover readiness" provisions that boards sometimes put in place. Each company in their database is given a score, from zero to six, based on the number of these provisions that the company has in the given year or month. A higher E_index implies poor shareholder rights and adverse effects on management behavior and incentives.

In this study, I also include other indicators of corporate governance such as dual-class shares, CEO-chair duality (CEO is also a chairman), and CEO stock ownership. Firms with dual-class shares have poor shareholder rights because voting power is concentrated in shares with voting right. CEO-chair duality implies excessive power of the CEO and likelihood to engage in discretionary behavior. Insider stock ownership is an indication of the manager's entrenchment incentive. I control for these corporate governance measures in my estimation models because it has been suggested that the impacts of corporate governance practices are additive.

1.4.6 Other explanatory variables

Based on prior literature, I have a number of control variables in my empirical models. The control variables include firm size, sales growth, asset turnover, firm age, CEO age, capital expenditure, return on assets, and book leverage. Firm size is measured as the natural logarithm of total assets. Sales growth is the yearly change in sales revenue. Return on assets (ROA) is to control for profitability. CAPEX is a log transformation of capital expenditure of the firm for year t. Book leverage is total debt divided by total assets.

All the regressions include year and industry fixed effects, where the industry is defined at the 2-digit SIC level.

1.5 THE MODEL

To test hypotheses 1 and 2 I run pooled OLS time series cross-sectional regressions and fixed effects models using panel data. My regression model has the following specification:

$$TotalCitation_{i,t} = c + \beta_1 OverCEO_{i,t} + \beta_2 CEO\_ChairDuality_{i,t} + \beta_3 Lerner\_Index_{i,t} + \beta_4 E\_index_{i,t} + \beta_5 DualClass_{i,t} + \beta_6 OverCEO*G\_index_{i,t} + \beta_7 OverCEO*HighG\_index_{i,t} + \beta_8 OverCEO*LowG\_index_{i,t} + \beta_9 CEOShareOwnership*OverCEO + \beta_{10} SOX*OverCEO_{i,t} + \beta_{11} CEOAge_{i,t} + \beta_{12} InstitutionalOwnership_{i,t} + \beta_{13} InsiderShareHeld_{i,t} + \beta_{14} CEOShareOwnership_{i,t} + \beta_{15} FirmAge_{i,t} + \beta_{16} ROA_{i,t} + \beta_{17} dSALE_{i,t} + \beta_{18} BLEV_{i,t} + \beta_{19} CAPEX_{i,t} + \eta_{i,t} \quad (1)$$

where

Total Citation is the total number of citations summed across all patents applied for during the year. OverCEO is a (01) dummy variable that has a value of 1 if the CEO is considered overconfident, and equals zero otherwise. A CEO is considered overconfident if he failed to exercise vested options that are at least 67% in-the-money. CEO/Chair duality is a (01) dummy variable that has a value of 1 if the CEO is also the board chairman, and is zero otherwise. Dual-class shares is a (01) dummy that has a value of 1 if the firm has dual-class equity, and equals zero otherwise. OverCEO*G_Index is an interaction variable between CEO overconfidence and corporate governance. ChairDuality*OverCEO is an interaction variable between CEO/Chair duality and CEO overconfidence. SOX*OverCEO is an interaction variable between the effect of Sarbanes-Oxley and CEO overconfidence. SOX is a (01) dummy variable that has a value of 1 in the years before 2003, and is 0 otherwise. CEO_shares_held is the percentage of CEO stock ownership excluding options. Among the control variables, dSALE is sales growth measured as the log of firm sales divided by prior year sales. ROA is return on assets, computed as operating income before depreciation to book assets. Book leverage is ratio of total debt to book assets. Firm age is calculated as the difference between the year the firm applied for patent and the year the firm is first established, after taking into

account ownership changes due to merger and acquisition activity. CAPEX is the log of capital expenditure.

To examine whether overconfident CEOs invest in firm innovation to benefit personal interests or shareholders (hypothesis 2), I investigate the effect of firm innovation by overconfident CEOs on firm performance. The following model is used:

$$LeadMTB_{i,t} = c + \beta_1 OverCEO_{i,t} + \beta_2 TotalCitation_{i,t} + \beta_3 OverCEO*Innovation_{i,t} + \beta_4 OverCEO*Innovation*G\_index_{i,t} + \beta_5 OverCEO*Innovation*HighG\_index_{i,t} + \beta_6 OverCEO*Innovation*LowG\_index_{i,t} + \beta_7 G\_Index_{i,t} + \beta_8 CEOShareOwnership + \beta_9 CEOAge_{i,t} + \beta_{10} Size_{i,t} + \beta_{11} Salechg\_AT_{i,t} + \beta_{12} BLEV_{i,t} + \beta_{13} Competition_{i,t} + \eta_{i,t} \quad (2a)$$

$$LeadROA_{i,t} = c + \beta_1 OverCEO_{i,t} + \beta_2 OverCEO*Innovation_{i,t} + \beta_3 OverCEO*Innovation*G\_index_{i,t} + \beta_4 OverCEO*Innovation*HighG\_index_{i,t} + \beta_5 OverCEO*Innovation*LowG\_index_{i,t} + \beta_6 DualTitle_{i,t} + \beta_7 Size_{i,t} + \beta_8 SaletoAssets_{i,t} + \beta_9 Competition_{i,t} + \eta_{i,t} \quad (2b)$$

$$LeadSaleGrowth_{i,t} = c + \beta_1 OverCEO_{i,t} + \beta_2 TotalCitation_{i,t} + \beta_3 OverCEO*Innovation_{i,t} + \beta_4 OverCEO*Innovation*G\_index_{i,t} + \beta_5 OverCEO*Innovation*HighG\_index_{i,t} + \beta_6 OverCEO*Innovation*LowG\_index_{i,t} + \beta_6 DualTitle*OverCEO_{i,t} + \beta_{10} Size_{i,t} + \beta_9 CEOAge_{i,t} + \beta_{11} FirmAge_{i,t} + \beta_{12} CAPX_{i,t} + \beta_{13} Competition_{i,t} + \eta_{i,t} \quad (2c)$$

where Firm Performance is measured by Tobin's q, ROA, and sales growth, respectively. Tobin's q is calculated by dividing the market value of a company by total assets (Villaloonga and Amit 2006).

1.6 EMPIRICAL RESULTS

Table 1.1 provides descriptive statistics of selected variables of the sample. It is shown that the distribution of innovative activity in this sample is highly skewed. Total citation count has a mean of 143.9 and a median of 3.00; patent grants has a mean of 80.57 and a median of 13. The CEO overconfidence indicator is also

skewed with a mean of 0.34 and a median of 0. The firms are on average seasoned operations with a mean (median) firm age of 32.95 (33.0). CEO age has mean of 55.84 and a median of 56. The mean market competition index of 0.92 implies that the sampled firms are in highly competitive industries, which might be a factor responsible for the need to pursue innovative activity. Another implication of the highly competitive market is that the overconfident CEOs are likely subject to the discipline of market pressure, making self-interested managerial behavior less likely. There is, however, no clear evidence that the sampled firms are well-governanced. Institutional ownership of the sampled firms has a mean of 86% and a median of 87%, only a few firms in the sample have dual-class equity, but the CEO/Chair duality dummy variable has a mean (median) value of 0.65 (1.0), suggesting that many CEOs of the sampled firms are powerful because they are also the board chairpersons. Concentration of power in the hands of the CEO may lead to discretionary managerial behavior. In addition, both the mean (9.67) and median (10.0) of G_index are slightly higher than those reported by Gompers et al (2003). On the other hand, the mean (2.39) and median (3.00) of E_index are slightly smaller than those reported by Bebchuk et al. (2003). On average, the descriptive statistics show that the sampled firms are large, profitable, and have a relatively low leverage. The firms have a mean and median market-to-book ratio of 1.97 and 1.35, respectively. Sales growth has a mean of 11.22% and a median of 8.46%.

*** *Insert table 1.1 about here* ***

Table 1.2 shows the correlation coefficients among the major variables used in the estimation models of this study. All the coefficients are relative small in magnitude and are well within the standard acceptable range.

*** *Insert table 1.2 about here* ***

In Table 1.3a, I report the results on the effect of CEO overconfidence on firm innovation. The dependent variable is log(1+ total citation count). All the four model specifications in Table 1.3a have a relatively strong explanatory power as the average adjusted R-square is about 0.33. In this table, the pooled OLS regression technique is used. In the first two models, CEO overconfidence is positively related

to firm innovation with a significance level of 1 percent. This finding is consistent with those of Hirshleifer et al. (2010) and Galasso and Simcoe (2010). The focus in Table 1.3a is the effect of corporate governance on CEO overconfidence. In model 1, the coefficient of G_index*OverCEO is -0.843 and significant at the one percent level. It implies that poor corporate governance practices (high G_index) discourages overconfident CEOs to invest in innovative projects. The result is consistent with the implication that uncontrolled overconfident CEOs prefer to protect personal interests without assuming risk. This is consistent with the findings of many studies on agency problems. In model 2 and model 4, the coefficient on HighG_index*OverCEO is negative and significant at one percent and 10%, respectively; confirming the observation in model 1. Interestingly, in models 3 and 4, the coefficient on LowG_index*OverCEO is positive and significant at the 10% level. The result suggests that overconfident CEOs, when monitored by good corporate governance practices, invest more in innovative projects. That is, overconfident CEOs are encouraged to assume risk when agency problems are controlled. This finding is consistent with John et al. (2008) that good governance is associated with risk-taking incentives. Recall that the first objective of my study is to examine if overconfident CEOs overinvest in innovative projects. The result just reported sheds some light on my first objective. Prior literature shows that well-governanced firms can help overconfident CEOs make fewer mistakes in acquisition activity. Analogically, my results suggest that overconfident CEOs of well-governanced firms make fewer mistakes when selecting risky innovative projects. That is, the positive coefficient on LowG_index*OverCEO suggests that well-governanced overconfident CEOs select innovative projects that are likely good but risky. Given that overconfidence is not an agency problem; the good but risky innovative projects chosen by overconfident CEOs are not overinvestments. On the other hand, the significant negative coefficient on HighG_index*OverCEO is consistent with the implication that firms with poor governance practices cause overconfident CEOs to refrain from investing in innovative projects, that is, they underinvest (invest inadequately) in innovation activity. My result is strong because adding the control for other proxies of corporate governance mechanisms such as CEO/Chair duality, dual-class equity, CEO stock ownership, and the impact of SOX does not reduce the significance of the impact of

G_index on overconfident CEOs. In addition, the other corporate governance mechanisms have coefficients that are significant with the expected sign.

*** *Insert table 1.3A about here* ***

In Table 1.3b, I repeat the above regression analysis using fixed effects models to control for the problem of missing variables. Results are stronger than using the pooled OLS regression technique. The sign of the coefficient on OverCEO is positive and significant at the one percent level in all the four models, confirming the results in prior literature. HighG_index*OverCEO is significantly negative at the one percent level in model 2 and model 4. LowG_index*OverCEO also has a significant positive coefficient in model3 and model 4. In addition, the adjusted R squares are about 50% higher than those in table 1.3a with an average value of 0.49.

*** *Insert table 1.3B about here* ***

In Table 1.4a, I use E_index instead of G_index as the measure of corporate governance. The result in Table 1.4a is very similar and consistent with that reported in Table 1.3a. The coefficient on OverCEO is positive and significant in all the 4 specifications. HighE_index*OverCEO has a significant negative coefficient in model 2 and model 4. The coefficient on LowE_index *OcerCEO has a significant positive coefficient in models 3 and 4.

Results of the fixed effects models using E-index in Table 1.4b are weaker. The coefficient on OverCEO is insignificant in all the four model specifications. Similar to the results in other tables, the coefficient on HighE_index*OverCEO is negative and significant at the one percent level in models 2 and 4. However, the coefficient of LowE_index*OverCEO is not significant in either model 3 or model 4.

*** *Insert table 1.4A about here* ***

In Tables 1.5 to 1.7, I report results pertaining to the second objective of my study. That is, I report results that answer the question whether overconfident CEOs invest in innovative projects to enhance firm value or personal benefits. Hirshleifer et

al. (2010) find inconclusive evidence regarding the effect of CEO overconfidence on firm performance.

In panel A of Table 1.5, the dependent variable is Tobin's Q. We follow Villaloonga and Amit (2006) in measuring Tobin's Q as market value divided by book assets. All the four models in Table 1.5 have relatively high explanatory power as the average adjusted R-square is about 0.41. The coefficient on OverCEO is positive and significant at the one percent level in all the four models. This finding is consistent with the result of Hirshleifer et al. (2010). The coefficient on innovation is positive in all the four models but significant only in model 1 and model 3. The coefficient on OverCEO*Innovation, however, is positive and significant in all the four models despite the level of significance is only 10% in the last three models. Our focus in this table is on the effect of corporate governance. In model 1, OverCEO*Innovation*GIndex has a negative but insignificant coefficient. In models 2 and 4, OverCEO*Innovation*HighGindex has a negative coefficient that is significant at the one percent level. The result indicates that innovative projects made by overconfident CEOs of poorly-governanced firms have a strong negative impact on firm value. The finding is consistent with the implication that overconfident CEOs of firms with poor governance, if left uncontrolled, might end up accepting too many risky projects that have low expected payoffs. As a result, firm value is reduced. On the other hand, the coefficient on OverCEO*Innovation*LowG_index is positive in both models 3 and 4, despite only significant at the 10 percent level in model 3. The positive coefficient on OverCEO*Innovation*LowG_index implies that well-governanced overconfident CEOs pursue risky innovative projects to enhance firm value. Panel B of Table 1.5 presents the result using fixed effect models. The coefficient on OverCEO remains positive and significant at the one percent level in all the four models. The coefficient on innovation is also significant and positive in the models. The coefficient on OverCEO*Innovation is positive in model 1 but negative in the remaining three models. OverCEO*Innovation has a negative coefficient that is significant at the one percent level. Unlike the pooled OLS regression results, the coefficient of OverCEO*Innovation*HighGindex is insignificant in model 2 and model 4; whereas the coefficient of OverCEO*Innovation*LowGindex is positive and significant at the one percent level in models 3 and 4. In short,

regression results on the relation between CEO overconfidence and firm innovation provide some evidence that are consistent with the implication that well-governanced firms can monitor overconfident CEOs to accept innovative projects that are risky but good and enhance firm value. On the other hand, poorly-governanced firms could not deter overconfident CEOs in accepting innovative projects that are bad and have low expected payoffs, resulting in losses of firm value.

*** *Insert table 1.5A,B about here* ***

The firm performance measure is Table 1.6A and 1.6B is return on assets (ROA). In table 1.6A, CEO confidence has a weak impact on ROA. The coefficient on OverCEO is insignificant in models 1 and 2, and significant only at the 10 percent level in models 3 and 4. OverCEO*Innovation is positive and significant at the one percent level in model one, but OverCEO*Innovation*Gindex is negative and significant at the one percent level in the same model. The coefficient on OverCEO*Innovation*HighGindex is negative and significant at the 10 percent level only in model 2. On the other hand, the coefficient on OverCEO*Innovation*LowGindex is positive and significant at the one percent level in models 3 and 4. In short, there is strong evidence that the investment in innovative projects by overconfident CEOs of well-governanced firms improves the return on assets; but the negative impact on the ROA of poorly-governance firms is relatively weak. Overall, the results are consistent with those in Tables 1.5A and 1.5B where firm performance is measured by Tobin's q.

*** *Insert table 1.6A,B about here* ***

In Tables 1.7A and 1.7B, firm performance is measured by the growth of sales. Unlike the results in Tables 1.5 and 1.6, all the salient variables have insignificant coefficients. Therefore, it is unable to determine if the investment in innovative projects by overconfident CEOs represent efforts to benefit self-interests or the interest of shareholders.

*** *Insert table 1.7A,B about here* ***

In sum, the result in Tables 1.5 to 1.7 shows evidence that overconfident CEOs innovate to increase (decrease) firm value if the firm has good (bad) corporate governance practices.

Computing the economic impact of regression variables from regression coefficients (Table 3a):

In table 1.3A with Log_TotalCitation is a proxy of firm innovation, regressing LogTotalCitation on LogGindex*OverCEO among others gives a coefficient of LogGindex*OverCEO of -0.843. To find the economic impact of increase LogGindex (worse Corporate Governance practices) interacted with Overconfident CEO from the 1st to the 3rd quartile: we first multiply -0.843 by interquantitle of LogGindex*OverCEO of 1.946 (table 1.3 -panel C) which results in -1.640. This gives the decrease in the dependent variable associated with an increase in LogGindex*OverCEO from the 1st to the 3rd quartile of the distribution. Then we compare this decrease in firm innovation to the average firm innovation across firms. This comparison shows that an increase in LogGindex*OverCEO from the 1st to the 3rd quartile of the distribution results in a -64.37% (= -1.64/2.548) decrease in firm innovation relative to the cross-sectional mean of LogTotalCitation.

*** *Insert table 1.3C about here* ***

The base model (2) table 1.3A shows that with the options-based measure, HighGindex interacted with Overconfident managers are negatively associated with significantly lower total citation ($p < 0.01$). The coefficient in model (1) table 1.3A shows that having an HighGindex*OverconfidentCEO decreases Log(1 + totalcitation) by -0.247. From Table 1.3 panel D, the mean number of totalcitation for non-HighGindex*Overconfident managers is 287.2, implying log(1+totalcitation) of 5.664. So HighGindex*OverconfidentCEO decreases this variable by 0.247, to 5.417. This implies an decrease in the number of totalcitation to exp(5.417) – 1 = 224.13. This represents a decrease in the number of totalcitation by (224.13/287.2) – 1 = -21.96%.

*** *Insert table 1.3D. here* ***

The base model (1) table 1.3A also shows that with the options-based measure, LowGindex interacted with Overconfident managers are positively associated with significantly higher total citation ($p < 0.01$). The coefficient in model (3) table 1.3A shows that having an LowGindex*OverconfidentCEO increases Log(1 + totalcitation) by +0.245. From Table 1.3 panel E, the mean number of totalcitation for non-LowGindex*Overconfident managers is 155.63, implying log(1+totalcitation) of 5.054. So LowGindex*OverconfidentCEO increases this variable by 0.245, to 5.299. This implies an increase in the number of totalcitation to exp(5.299) – 1 = 199.11. This represents an increase in the number of totalcitation by (199.11/155.63) – 1 = +27.94%.

*** *Insert table 1.3E about here* ***

1.7 ROBUSTNESS TEST

For robustness purpose, I repeat all of the above tests using patent count as the measure of innovation. Patent count is calculated by logarithm transformation of number of Patent grouped by "GVKEY" and "Year Patent applied for" in the NBER Patent database files. Tables 1.8A and 8B report descriptive statistics and Pearson correlation and p-value for Patent count models.

*** *Insert table 1.8A,B about here* ***

In Tables 1.9A and 9B, I report results on the relation between innovation and CEO overconfidence. The result in Table 1.9A is very similar and consistent with that reported in Table 1.3A and 1.3B. The coefficient on OverCEO is positive and significant in all the 4 specifications. HighG_index*OverCEO has a significant negative coefficient in model 2. The coefficient on LowG_index *OverCEO has a significant positive coefficient in models 3. The results imply that poorly-governanced (well-governanced) overconfident CEOs select innovative projects that are likely bad (good) but risky. Given that overconfidence is not an agency problem; the bad (good) but risky innovative projects chosen by overconfident CEOs are (not)

overinvestments. These results pertaining the first objective of my study are consistent with those reported in Tables 1.3 to 1.4.

*** *Insert table 1.9A,B about here* ***

In Tables 1.10 to 1.11, I report the robustness test result on the relation between innovations made by overconfident CEOs and firm performance. The results pertaining to the second objective of my study are also consistent with those reported in Tables 1.5 to 1.7.

*** *Insert table 1.10A,B about here* ***

*** *Insert table 1.11A,B about here* ***

*** *Insert table 1.12A,B about here* ***

1.8 CONCLUSIONS

In this study, I examine if overconfident CEOs overinvest or underinvest in innovative projects. I also investigate if overconfident CEOs pursue innovative projects to benefit personal interests or the interest of shareholders. By focusing on the effect of corporate governance in monitoring the behavior of overconfident CEOs, my results show there is a positive relation between CEO overconfidence and firm innovation for firms that have good governance practices. For these well-governanced firms, the overconfident CEOs do not overinvest because good risky projects are accepted. My results also show that there is a negative relation between CEO overconfidence and firm innovation among firms with poor governance. In these cases, the finding is consistent with the implication that overconfident CEO are entrenched and invest inadequately in innovative projects when the firm has poor corporate governance. The other important result of my study is that well-governanced firms could influence the behavior of overconfident CEOs so that firm performance (measured by Tobin's q, ROA, and sales growth) is enhanced. On the other hand, it is also found that overconfident CEOs of poorly-governanced firms

might pursue innovative projects so aggressively that projects with low expected payoff are accepted and results in poorer firm performance.

BIBLIOGRAPHY

Acharya V, L Pedersen, T Philippon, and M Richardson. 2009. "Measuring Systemic Risk", mimeo, New York University.

Adolf A. Berle and Gardiner C. Means, The Modern Corporation and Private Property (New York: Harcourt, Brace & World, [1932] 1968).

Aghion, Philippe, Bloom, Nick, Blundell, Richard,Griffith, Rachel and Howitt, Peter, 2006, "Competition and Innovation: An Inverted U Relationship?", Quarterly Journal of Economics, 120(2), pp. 701-728

Aghion, Philippe, John Van Reenen and Luigi Zingales, 2009, "Innovation and Institutional Ownership," NBER Working Paper 14769.

Aman, H. & Nguyen, P. (2008). Do Stock Prices Reflect the Corporate Governance Quality of Japanese Firms?. Journal of The Japanese and International Economies, 22, 647-662.

Amihud Y, Lev B. 1981. Risk reduction as a managerial motive for conglomerate mergers. Bell Journal of Economics 12: 605–617.

Ammann M, Oesch D, Schmid M (2011) Corporate governance and firm value: International evidence. Journal of Empirical Finance 18: 36–55.

Baker, Malcom, Xin Pan, and Jeffrey Wurgler, 2009, "A Reference Point Theory of Mergers and Acquisitions," Working Paper, Harvard Business School and New York University.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice- Hall, Inc.

Baumeister, R. F., Dori, G. A.,&Hastings, S. (1998). Belongingness and temporal bracketing in personal accounts of changes in self-esteem. Journal of Research in Personality, 32, 222-235.

Barber, Brad and Terrance Odean, 2001, "Boys will be Boys: Gender, Overconfidence, and Common Stock Investment," *Quarterly Journal of Economics* 116(1), 261-292.

Bebchuk L, Cohen A, Ferrell A (2009) What matters in corporate governance? Review of Financial Studies 22:783–827.

Bebchuk Lucian; Cohen, Alma, and Allen Ferrell, 2005, "What Matters in Corporate governance? ", The Review of Financial Studies.

Beyer, Mila; Dirk Czarnitzki, and Kornelius Kraft, 2010, "Managerial Ownership, Entrenchment and Innovation", Discussion Paper No. 11-026

Bhagat S, Bolton B (2008) Corporate governance and firm performance. Journal of Corporate Finance 14:257–273.

Bernardo, A. E. and I. Welch (2001). On the Evolution of Overcon_dence and Entrepreneurs. Journal of Economics & Management Strategy 10 (3), 301{330.

Burgstahler, D. and I.Dichev, 1997, "Earnings management to avoid earnings decreases and losses", Journal of Accounting and Economics, vol. 24, no.1, pp. 99-126.

Camerer, C., & D. Lovallo. (1999) "Overconfidence and Excessive Entry: An Experimental Approach." American Economic Review 89(1): 306-318.

Cohen, Daniel A. et al., 2007, "The Sarbanes-Oxley Act of 2002: Implications for Compensation Contracts and Managerial Risk-Taking 19, 22, working paper.

Coles, J.L., Daniel, N.D., Naveen, L., 2008. Boards: does one size fit all? Journal of Financial Economics 87, 329-356.

Coles, Jeffrey, Naveen Daniel, and Lalitha Naveen, 2006, "Managerial Incentives and Risktaking", *Journal of Financial Economics,* 79, 431-468.

Coles, Jeffrey L., Michael L. Lemmon, and J. Felix Meschke, 2003, Structural models and endogeneity in corporate finance: The link between managerial ownership and corporate performance, Working paper, Arizona State University.

Core J, Guay W, Rusticus T (2006) Does weak governance cause weak stock returns? An examination of firm operating performance and investors' expectations. Journal of Finance 61:655–687.

DeAngelo, H., L. DeAngelo, and E. Rice, "Going Private: Minority Freezeouts and Stockholder Wealth," Journal of Law & Economics, Vol. XXVII, pp. 367-401,1984.

DeFond, Mark, Mingyi Hung, and Robert Trezevant, 2007, Investor protection and the information content of annual earnings announcements: international evidence, Journal of Accounting and Economics 43, 37-67.

Degeorge, F., J.M. Patell, and R. Zeckhauser, 1999, „Earnings management to exceed thresholds", Journal of Business, vol. 72, no.1, pp. 1-33.

Dong, M., D. Hirshleifer, S. Richardson, and S. H. Teoh. "Does Investor Misvaluation Drive the Takeover Market?" Journal of Finance, 61 (2006), 725-762.

Dong, M., D. Hirshleifer, and S. H. Teoh. "Stock Market Misvaluation and Corporate Investment." (2007) Unpublished Working Paper.

Dougal, Casey, Joseph Engelberg, Christopher A. Parsons, and Edward D. Van Wesep, 2010. "Anchoring and the cost of capital." Mimeo, University of North Carolina at Chapel Hill.

Firth, F. , Fung, P., & Rui, O. (2001). Corporate governance and CE0 compensation in china. Working paper, 2001, Hong Kong polytechnic University.

Ferreira, M.A., Laux, P.A., 2007. Corporate governance, idiosyncratic risk, and information flow. Journal of Finance 62, 951-989.

Galasso, Alberto and Timothy Simcoe, 2010, "CEO Overconfidence and Innovation," Working Paper, Boston University.

Gervais, Simon, J. B. Heaton, and Terrance Odean, 2009, "Overconfidence, Compensation Contracts, and Labor Markets," Working Paper, Duke University.

Giroud, Xavier, and Holger M. Mueller, 2010, Does corporate governance matter in competitive industries?, Journal of Financial Economics 95, 312-331.

Goel, A. M. and A. V. Thakor (2008). Overcon_dence, CEO Selection, and Corporate Governance. Journal of Finance 63 (6), 2737{2784.

Gompers, P. A., Ishii, J. L., and Metrick, A., 2003. "Corporate governance and equity prices", The Quarterly Journal of Economics, 118(1), 107-155.

Griffin, Dale, and Amos Tversky, 1992, "The Weighing of Evidence and the Determinants of Confidence," *Cognitive Psychology* 24, 411–435.

Guedj, I., and D. S. Scharfstein, 2007, "Organizational Scope and Investment: Evidence from the Drug Development Strategies and Performance of Biopharmaceutical Firms," NBER Working Paper No. w10933.

Hall, Bronwyn, Adam Jaffe, and Manuel Trajtenberg, 2001, "The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools," NBER Working Paper 8498.

Hall, Bronwyn, Adam Jaffe, and Manuel Trajtenberg, 2005, "Market Value and Patent Citations," *RAND Journal of Economics* 36, 16-38.

Hall, Bronwyn and Rosemarie Ziedonis, 2001, "The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979–1995," *RAND Journal of Economics* 32, 101-128.

Harris, E. "Antitakeover Measures, Golden Parachutes, and Target Firm Shareholder Welfare." RAND Journal of Economics 21 (1990), 614-625.

Hart, Oliver, Firms, Contracts, and Financial Structure (Oxford: Oxford University Press, 1995).

Hilton, Denis, Isabelle Regner, Laure Cabantous, Laetitia Charalambides, and Stephane Vautier, "Do positive illusions predict overcon_dence in judgment? A test using interval production and probability evaluation measures of miscalibration," Journal of Behavioral Decision Making, 2011, 24 (2), 117{139.

Himmelberg, Charles P., R. Glenn Hubbard, and Darius Palia, 1999, Understanding the determinants of managerial ownership and the link between ownership and performance, Journal of Financial Economics 53, 353–384.

Hirshleifer, David A. ; Angie Low; and Siew Hong Teoh, (2010), " Are Overconfident CEOs Better Innovators?", working paper

Hirshleifer, D., A. Thakor, 1992, "Managerial Conservatism, Project Choice, and Debt," Review of Financial Studies, Vol. 5: 437-470.

Honoré, Florence and Federico MUNARI, 2010, "Corporate Governance Practices and Companies' R&D Orientation: Evidence From European Countries", working paper.

Jensen, 1993. "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems." Journal of Finance 48, no. 3: 831-80.

Jensen, M., and K. Murphy. 1990. "Performance Pay and Top-Management Incentives." Journal of Political Economy 98: 225-64.

Jensen, M.C. and R.S. Ruback. 1983. The market for corporate control: The scientific evidence, Journal of Financial Economics 11, 5-50.

Jensen, M. and Meckling, W. (1976). Theory of the Firm: Managerial Behaviour, Agency Costs, and Ownership Structure. Journal of Financial Economics, pp.305-360.

John, K., L. Litov, B. Yeung, 2008. Corporate governance and risk-taking. The Journal of Finance 63. 1679-1728.

Kahneman, D., & Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin & D. Kahneman (Eds.), Heuristics and biases: The psychology of intuitive judgment (pp. 49-81). New York: Cambridge University Press.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrica, 47, 263-291.

Kidd, J.B. (1970) .The utilization of subjective probabilities in production planning. Acta Psychologica 34, 338.347.

Kolasinski, Adam C; Li, Xu. 2011, "Do independent directors restrain overconfident CEOs?" Working Paper.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R.W. (1998), "Law and Finance", Journal of Political Economy, 106(6), 1113-1155.

La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (1999), "Corporate ownership around the world" The Journal of finance, 54(2), 471–517.

Langer, E. J. (1975). The illusion of control. Journal of Personality and Social Psychology,32(2), 311-328.

Leuz, C.; Nanda, D.; and P. Wysocki. "Earnings Management and Investor Protection: An International Comparison." Journal of Financial Economics 69 (2003): 505-527.

Lhuillery, S., (2009), "The impact of corporate governance practices on R&D intensities of firms: An econometric studies of French largest companies" Sses Annual Meeting Industrial Organization, Innovation and Regulation Lugano, March 9-10, 2006.

Malmendier, Ulrike and Geoffrey Tate, 2005a. "CEO Overconfidence and Corporate Investment," *Journal of Finance* 60, 2661-2700.

Malmendier, Ulrike and Geoffrey Tate, 2005b. "Does Overconfidence Affect Corporate Investment? CEO Overconfidence Measures Revisited," *European Financial Management*, November 11, 649–659.

Malmendier, Ulrike and Geoffrey Tate, 2008, "Who Makes Acquisitions? CEO Overconfidence and the Market's Reaction," *Journal of Financial Economics* 89, 20-43.

Malmendier, Ulrike, Geoffrey Tate, and Jon Yan, 2010, "Managerial Beliefs and Corporate Financial Policies," Working Paper, University of California, Berkeley. 40.

Miller, W. R., & Rose, H. C. (1975). Instructors and their jobs. Chicago: American Technical Society.

Morck, R. & Nakamura, M. (1999). Banks and corporate control in Japan. Journal of Finance, 54, 319–339.

Morck, Randall, Daniel Wolfenzon, and Bernard Yeung. 2005. "Corporate Governance, Economic Entrenchment and Growth," Journal of Economics Literature, Vol. XLIII (September), pp. 657–722. (also listed as NBER Working Paper 10692; 2004).

Moore, D. A., & Healy, P. J. (2008), .The trouble with overcon.dence,.Psychological Re- view, 115(2), 502-517.

Moore, P.G. (1977) .The manager.s struggles with uncertainty.Journal of the Royal Statistical Society 140, 129.165.

Odean, Terrance, 1998. Are Investors Reluctant to Realize Their Losses? The Journal of Finance, 53(5), 1775{1798.

Pham, P.K., J.A. Suchard and J. Zein. 2007. "Corporate Governance, Cost of Capital and Performance: Evidence from Australian Firms." Working Paper available on the Social Science Research Network, Electronic Library at: www.ssrn.com.

Rhodes-Kropf, M. & Viswanathan, S. (2004), 'Market Valuation and Merger Waves', Journal of Finance, 59, 2685-2718.

Roll, R., 1986, The hubris hypothesis of corporate takeovers, Journal of Business 59, 197-216.

Sandra Ludwig; Philipp C. Wichardt; and Hanke Wickhorst, 2011, "On the Positive Effects of Overconfident Self-Perception in Teams", Working Paper.

Schmidt JB, Calantone RJ. Are really new product development projects harder to shut down? Journal of Product Innovation Management 1998;15(2):111–23.

Shadab, Houman B., (2008), "Innovation and Corporate Governance: The Impact Of Sarbanes-Oxley", University of Pennsylvania Journal of Business and Employment Law, Vol. 10, No. 4, 2008

Shefrin, Hersh, 2000. Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing. Financial Management Association Survey and Synthesis Series. Boston, MA: Harvard Business School Press.

Shleifer, A. & Vishny, R. W. (2003), 'Stock Market Driven Acquisitions', Journal of Financial Economics, 70, 295-311.

Shleifer, A., Vishny, R., 1986. Large shareholders and corporate control. Journal of Political Economy 94, 461-488.

Smith, C.W. and R.L. Watts (1992), "The investment opportunity set and corporate financing, dividend and compensation policies" Journal of Financial Economics 32, 263-292.

Staw, B. M., & Ross, J. 1989. Understanding behavior in escalation situations. Science, 246: 216-220.

Stein, J., 1988, Takeover threats and managerial myopia, Journal of Political Economy 96, 61-80.

Stulz, René M. 2005. "The Limits of Financial Globalization," Journal of Finance, forthcoming.

Stulz, R., 1990. "Managerial discretion and optimal financing policies," Journal of Financial Economics, 1990, Vol.26, pp.3-27.

Svenson, O. (1981): "Are We Less Risky and More Skillful Than Our Fellow Drivers," Acta Psychologica, 47, 143–148.

Taylor, S. E. & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health.(Psychological Bulletin, 103, 193—210.)

Tharenou, P. (1979). Employee self-esteem: A review of the literature. Journal of Vocational Behavior, 15, 316-346.

Tirole, J. (2001). Corporate Governance. Econometrica 69, 1{35.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. Science, 211, 453-458.

Urban Nuldén (1996), "Escalating? Who? Me?", Information Systems Research Seminar in Scandinavia.

Weinstein, Neil, 1980, —Unrealistic Optimism about Future Life Events,‖ Journal of Personality and Social Psychology 39, 806-820.

Wintoki, M. Babajide, (2007), "Corporate Boards and Firm Value: The Effects of the Sarbanes-Oxley Act and the 2002 Exchange Listing Requirements, 13 J. CORP. FIN. 229, 243, 246-47.

Wurgler, Jeffrey; Baker, Malcolm; and Pan, Xin; 2012 "The effect of reference point prices on mergers and acquisitions, Journal of Financial Economics.

Table 1.1. Descriptive Statistics of the sampled firms

Variable	N	Maximum	Minimum	Mean	Median	Std Dev
TotalCitation	1,729	16,291.00	0.00	143.94	3.00	954.52
OverCeo_dummies	1,729	1.00	0.00	0.34	0.00	0.47
Firmage	1,729	57.00	1.00	32.95	33.00	18.68
CEOage	1,729	89.00	35.00	55.84	56.00	7.24
TitleDual_dummies	1,729	1.00	0.00	0.66	1.00	0.48
Competition	1,729	1.00	0.60	0.92	0.92	0.06
G_index	1,729	18.00	3.00	9.67	10.00	2.73
E_index	1,729	6.00	0.00	2.39	3.00	1.32
InstShareOwned	1,729	1.35	0.27	0.86	0.87	0.13
InsiderShareOwned	1,729	43.99	0.00	1.99	0.66	4.30
CEOShareOwned	1,729	1,32	0.00	0.0094	0.00025	0.079
DualClass_dummies	1,729	1.00	0.00	0.07	0.00	0.25
SOX_dummies	1,729	1.00	0.00	0.37	0.00	0.48
Size (in $million)	1,729	750,507.00	109.15	13,917.39	3,346.65	47,525.58
MTB	1,729	26.30	0.02	1.97	1.35	2.07
SaleToAssets	1,729	4.29	0.10	0.95	0.87	0.51
CAPX (in $million)	1,729	33,143.00	0.63	663.13	139.90	2,307.61
ROA	1,729	48.15	-290.84	5.26	5.94	11.42
EBITDAtoSALE	1,729	0.33	-1.74	0.01	0.01	0.07
Book Leverage	1,729	144.04	0.00	23.10	22.77	16.61

Table 1.2. Pearson correlations and p-value among key variables

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0	Total citation	Over CEO	G_index	Dual Title	Competi _tion	Dual class	CEO Share Owned	Size	Firm Age	CEO Age	CAPX	ROA	DAT
Total citation	1.000												
OverCeo	0.106	1.000											
	<.0001												
G_index	-0.167	-0.073	1.000										
	<.0001	0.003											
Dual Title	0.011	-0.031	0.158	1.000									
	0.642	0.194	<.0001										
Competition	-0.027	-0.059	0.051	-0.013	1.000								
	0.266	0.015	0.035	0.584									
Dual class	0.042	0.010	-0.151	0.053	0.047	1.000							
	0.084	0.676	<.0001	0.027	0.052								
CEO Share Owned	0.078	0.102	-0.118	0.138	-0.039	-0.009	1.000						
	0.001	<.0001	<.0001	<.0001	0.111	0.695							
Size	0.229	-0.074	0.028	0.228	-0.042	0.060	0.139	1.000					
	<.0001	0.002	0.244	<.0001	0.081	0.013	<.0001						
FirmAge	0.010	-0.101	0.179	0.100	0.111	-0.092	-0.062	0.210	1.000				
	0.685	<.0001	<.0001	<.0001	<.0001	0.000	0.011	<.0001					
CEOAge	0.036	0.024	0.061	0.275	-0.067	-0.005	0.096	0.075	0.029	1.000			
	0.141	0.315	0.011	<.0001	0.006	0.827	<.0001	0.002	0.231				
CAPX	0.288	-0.048	0.019	0.208	-0.109	0.047	0.115	0.902	0.206	0.101	1.000		
	<.0001	0.048	0.443	<.0001	<.0001	0.054	<.0001	<.0001	<.0001	<.0001			
ROA	-0.053	0.184	0.073	0.075	-0.028	0.021	0.080	0.051	0.084	0.048	0.063	1.000	
	0.029	<.0001	0.003	0.002	0.239	0.388	0.001	0.034	0.001	0.049	0.009		
DAT	0.020	-0.154	0.094	0.145	0.002	0.004	-0.042	0.193	0.102	0.063	0.160	-0.251	1.000
	0.418	<.0001	<.0001	<.0001	0.921	0.864	0.085	<.0001	<.0001	0.009	<.0001	<.0001	

Table 1.3A. Relation between firm innovation and CEO overconfidence (Pooled OLS regressions). G_index is the measure of corporate governance

This table shows the results from pooled OLS regressions **Total citation count** as dependent variable and **G_Index*OverCEO**; Low**G_Index*OverCEO;** High**G_Index*OverCEO ChairDuality*OverCEO; DualClass*OverCEO; SOX*OverCEO** and **CEO share ownership*OverCEO** as the key explanatory variables. Dependent variable is firm innovation proxied by total citation which count total number of citations summed across all patents applied for during the year, NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index; DualityTitle*OverCEO; Dualclass*OverCEO; SOX*OverCEO and CEOShareOwnership*OverCEO all are interactions of two categorized variables between an indicator variable of OverCEO variable and the interacted variables. Institutional share ownership (%) is percentage of common stocks to total outstanding common shares held by an institutional investor. CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Growth in Sales is calculated as natural logarithm of ratio of $sale_t$ to $sale_{t-1}$. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,729 observations.

VarName	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	0.875	1.257	0.979	0.729
		[0.602]	[0.864]	[0.672]	[0.905]
OverCeo	+	2.195***	0.505***	0.250	-0.051
		[4.147]	[2.932]	[1.421]	[-0.503]
CEO/Chair duality	-	-0.423***	-0.415***	-0.415***	-0.094
		[-3.759]	[-3.695]	[-3.689]	[-1.516]
Competition	+	1.633**	1.600**	1.618**	-0.028
		[2.310]	[2.262]	[2.283]	[-0.071]
Dual-class chares	+	0.560***	0.566***	0.557***	0.008
		[2.797]	[2.828]	[2.777]	[0.072]
ChairDuality*OverCEO	+	0.218	0.215	0.176	0.322***
		[1.201]	[1.182]	[0.971]	[3.194]
LogG_indexOverceo	-	-0.843***			
		[-3.611]			
HighG_indexOverCEO	-		-0.247***		-0.075*
			[-3.738]		[-1.948]
LowG_indexOverCEO	+			0.245***	0.232***
				[2.804]	[4.532]
SoxOverceo	-	-0.549***	-0.573***	-0.564***	-0.137
		[-3.010]	[-3.142]	[-3.085]	[-1.360]
DualClass*OverCEO	-	-0.737**	-0.769**	-0.725**	0.241
		[-2.151]	[-2.242]	[-2.111]	[1.265]
CEOShareOwned*Overceo	+	0.058***	0.060***	0.056***	-0.006
		[2.977]	[3.098]	[2.881]	[-0.595]

Table 1.3A. (continued)

VarName	Expected signs	Model 1	Model 2	Model 3	Model 4
Size	+ or -	0.211***	0.213***	0.206***	-0.037
		[2.884]	[2.912]	[2.815]	[-0.910]
Growth in sales	-	-0.003*	-0.003*	-0.003*	-0.000
		[-1.893]	[-1.822]	[-1.748]	[-0.388]
Sale to Assets	-	-0.515***	-0.527***	-0.516***	-0.106**
		[-5.495]	[-5.632]	[-5.485]	[-2.047]
Firm Age	+ or -	0.015	0.020	0.004	0.046
		[0.295]	[0.391]	[0.087]	[1.635]
CEO Age	-	-0.178	-0.269	-0.193	-0.327*
		[-0.541]	[-0.815]	[-0.582]	[-1.782]
CAPX	+	0.210***	0.206***	0.213***	0.150***
		[3.266]	[3.204]	[3.304]	[4.212]
ROA	-	-0.016***	-0.016***	-0.017***	-0.003
		[-3.915]	[-4.014]	[-4.048]	[-1.222]
Book Leverage (DAT)	-	-1.188***	-1.187***	-1.196***	-0.014
		[-4.020]	[-4.017]	[-4.035]	[-0.087]
Adjusted R-squared		0.3418	0.3422	0.3398	0.3098

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

Table 1.3B: Relation between firm innovation and CEO overconfidence (Fixed effects models). G_index is the measure of corporate governance

This table shows the results from fixed effects models using **Total citation count** as dependent variable and **G_Index*OverCEO**; Low**G_Index*OverCEO; High**G_Index*OverCEO ChairDuality*OverCEO; DualClass*OverCEO; SOX*OverCEO** and **CEO share ownership*OverCEO** as the key explanatory variables. Dependent variable is firm innovation proxied by total citation which count total number of citations summed across all patents applied for during the year, NBER Patent database files.
OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index; DualityTitle*OverCEO; Dualclass*OverCEO; SOX*OverCEO and CEOShareOwnership*OverCEO all are interactions of two categorized variables between an indicator variable of OverCEO variable and the interacted variables. Institutional share ownership (%) is percentage of common stocks to total outstanding common shares held by an institutional investor. CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Growth in Sales is calculated as natural logarithm of ratio of $sale_t$ to $sale_{t-1}$. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 227 cross sections x 9 timeseries.

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	2.415	2.796*	2.511	2.692*
		[1.479]	[1.718]	[1.542]	[1.658]
OverCeo	+	3.088***	1.349***	1.058***	1.198***
		[4.790]	[7.872]	[6.040]	[6.439]
CEO/Chair duality	-	-0.219*	-0.211*	-0.212*	-0.211*
		[-1.871]	[-1.803]	[-1.813]	[-1.811]
Competition	+	2.187***	2.150***	2.150***	2.103***
		[2.905]	[2.857]	[2.842]	[2.801]
Dual-class chares	+	0.588***	0.593***	0.585***	0.594***
		[2.759]	[2.786]	[2.749]	[2.788]
ChairDuality*OverCEO	+	0.125	0.116	0.086	0.129
		[0.664]	[0.620]	[0.463]	[0.694]
G_indexOverceo	-	-0.868***			
		[-3.058]			
HighG_indexOverCEO	-		-0.247***		-0.194***
			[-3.743]		[-2.783]
LowG_indexOverCEO	+			0.298***	0.216**
				[3.016]	[2.071]
SoxOverceo	-	-1.993***	-2.025***	-1.998***	-2.003***
		[-15.572]	[-15.712]	[-15.438]	[-15.577]
DualClass*OverCEO	-	-0.680*	-0.713**	-0.679*	-0.749**
		[-1.922]	[-1.978]	[-1.955]	[-2.119]

Table 1.3B (continued)

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
CEOShareOwned*Overceo	+	0.050**	0.052***	0.047**	0.048**
		[2.442]	[2.558]	[2.309]	[2.340]
Size	+ or -	-0.169**	-0.169**	-0.173**	-0.173**
		[-2.279]	[-2.291]	[-2.340]	[-2.349]
Growth in sales	-	-0.003	-0.003	-0.003	-0.003
		[-1.493]	[-1.465]	[-1.403]	[-1.487]
Sale to Assets	-	-0.471***	-0.483***	-0.468***	-0.467***
		[-4.835]	[-4.989]	[-4.825]	[-4.819]
Firm Age	+ or -	-0.016	-0.013	-0.026	-0.013
		[-0.299]	[-0.224]	[-0.479]	[-0.235]
CEO Age	-	-0.091	-0.181	-0.109	-0.165
		[-0.244]	[-0.487]	[-0.292]	[-0.445]
CAPX	+	0.502***	0.500***	0.504***	0.503***
		[7.384]	[7.393]	[7.393]	[7.431]
ROA	-	-0.012***	-0.013***	-0.013***	-0.013***
		[-3.145]	[-3.293]	[-3.284]	[-3.270]
Book Leverage (DAT)	-	-0.404	-0.406	-0.397	-0.359
		[-1.367]	[-1.373]	[-1.333]	[-1.210]
R-squared		0.4896	0.4873	0.4803	0.4921

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively

Table 1.3C. Firm-level summary statistics for Log_Gindex*OverCEO and Log_TotalCitation

	75% Q3	50% Median	MEAN	25% Q1	Interquartile
Log_TotalCitation	4.234	2.079	2.548	0.000	4.234
Log_GindexOverCEO	1.946	0.000	0.738	0.000	1.946

Table 1.3D. Firm-level summary statistics for HighGindex*OverCEO and NonHighGindex*OverCEO

	HighG_index*OverCEO		NonHighG_index*OverCEO	
	(N=459)		(N=1269)	
Variable	Mean	Median	Mean	Median
Totalcitation	102.35	7.00	287.20	7.00
Size	8.331	8.365	8.256	7.994
LogCAPX	5.072	5.074	5.000	4.890
ROA	5.640	5.440	5.535	6.350
DAT	0.261	0.259	0.211	0.205
Competition	0.922	0.918	0.916	0.917

Table 1.3E. Firm-level summary statistics for LowGindex*OverCEO and NonLowGindex*OverCEO

	LowG_index*OverCEO		NonLowG_index*OverCEO	
	(N=409)		(N=1319)	
Variable	Mean	Median	Mean	Median
Totalcitation	504.05	10	155.63	6.00
Size	8.306	7.825	8.267	8.220
LogCAPX	5.065	4.738	5.005	4.997
ROA	5.618	6.750	5.546	5.910
DAT	0.189	0.168	0.235	0.237
Competition	0.916	0.915	0.918	0.917

Table 1.4A: Relation between firm innovation and CEO overconfidence (Pooled OLS regressions). E_index is the measure of corporate governance.

This table shows the results from pooled OLS regressions using **Total citation count** as dependent variable and **E_Index*OverCEO**; **LowE_Index*OverCEO; HighE_Index*OverCEO ChairDuality*OverCEO; DualClass*OverCEO; SOX*OverCEO** and **CEO share ownership*OverCEO** as the key explanatory variables. Dependent variable is firm innovation proxied by total citation which count total number of citations summed across all patents applied for during the year, NBER Patent database files.
OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*E_Index; OverCEO*E_Index; DualityTitle*OverCEO; Dualclass*OverCEO; SOX*OverCEO and CEOShareOwnership*OverCEO all are interactions of two categorized variables between an indicator variable of OverCEO variable and the interacted variables. **Low(High)E_Index*OverCEO** are interaction variables in which the natural logarithm of E_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Growth in Sales is calculated as natural logarithm of ratio of $sale_t$ to $sale_{t-1}$. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000-6999) by the period 1998 through 2006. The sample included 1,339 observations.

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	-0.318	-0.349	-0.733	-0.355
		[-0.13]	[-0.14]	[-0.29]	[-0.14]
OverCeo	+	1.887***	1.295***	0.601*	1.163***
		[5.04]	[3.90]	[1.89]	[3.43]
CEO/Chair duality	-	-0.460***	-0.461***	-0.465***	-0.460***
		[-3.26]	[-3.27]	[-3.27]	[-3.26]
Competition	+	1.493*	1.591*	1.515*	1.577*
		[1.72]	[1.83]	[1.73]	[1.81]
ChairDuality*OverCEO	+	0.421*	0.416*	0.354	0.455**
		[1.87]	[1.84]	[1.56]	[2.01]
G_indexOverceo	-	-1.008***			
		[-5.73]			
HighG_indexOverCEO	-		-0.550***		-0.493***
			[-5.33]		[-4.60]
LowG_indexOverCEO	+			1.331***	0.813**
				[3.31]	[1.96]
SoxOverceo	-	-0.574**	-0.613**	-0.638***	-0.586**
		[-2.35]	[-2.52]	[-2.60]	[-2.40]
DualClass*OverCEO	-	-0.671	-0.685	-0.554	-0.673
		[-1.09]	[-1.11]	[-0.89]	[-1.09]
CEOShareOwned*Overceo	+ or -	-0.101**	-0.110**	-0.071	-0.109**
		[-2.12]	[-2.29]	[-1.50]	[-2.29]
Dual-class chares	+	0.373	0.366	0.370	0.373
		[1.05]	[1.02]	[1.03]	[1.05]

Table 1.4A. (continued)

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
CEOShareOwned	+	0.104***	0.104***	0.102***	0.105***
		[3.60]	[3.58]	[3.49]	[3.60]
Size	+ or -	0.156*	0.139	0.191**	0.143
		[1.73]	[1.54]	[2.10]	[1.57]
Growth in sales	-	-0.003	-0.003	-0.003	-0.003
		[-1.48]	[-1.46]	[-1.46]	[-1.46]
Sale to Assets	-	-0.418***	-0.436***	-0.431***	-0.428***
		[-3.47]	[-3.62]	[-3.55]	[-3.56]
Firm Age	+ or -	-0.018	-0.020	-0.024	-0.014
		[-0.29]	[-0.32]	[-0.38]	[-0.22]
CEO Age	-	-0.130	-0.105	-0.061	-0.106
		[-0.32]	[-0.26]	[-0.15]	[-0.26]
CAPX	+	0.254***	0.277***	0.232***	0.267***
		[3.19]	[3.46]	[2.89]	[3.34]
ROA	-	-0.018***	-0.018***	-0.018***	-0.018***
		[-4.04]	[-4.05]	[-4.01]	[-4.02]
Book Leverage (DAT)	-	-0.853**	-0.950***	-0.999***	-0.916**
		[-2.34]	[-2.61]	[-2.73]	[-2.52]
Adjusted R-squared		0.3108	0.3085	0.2992	0.3123

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively

Table 1.4B: Relation between firm innovation and CEO overconfidence (Fixed effects models). E_index is the measure of corporate governance.

This table shows the results from fixed effects models using **Total citation count** as dependent variable and **E_Index*OverCEO; LowE_Index*OverCEO; HighE_Index*OverCEO ChairDuality*OverCEO; DualClass*OverCEO; SOX*OverCEO** and **CEO share ownership*OverCEO** as the key explanatory variables. Dependent variable is firm innovation proxied by total citation which count total number of citations summed across all patents applied for during the year, NBER Patent database files.
OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*E_Index; OverCEO*E_Index; DualityTitle*OverCEO; Dualclass*OverCEO; SOX*OverCEO and CEOShareOwnership*OverCEO all are interactions of two categorized variables between an indicator variable of OverCEO variable and the interacted variables. **Low(High)E_Index*OverCEO** are interaction variables in which the natural logarithm of E_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Growth in Sales is calculated as natural logarithm of ratio of $sale_t$ to $sale_{t-1}$. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000-6999) by the period 1998 through 2006. The sample included 1,339 observations.

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	-3.155	-2.979	-3.263	-3.004
		[-1.47]	[-1.39]	[-1.51]	[-1.40]
OverCeo	+	0.251	-0.044	-0.322	-0.054
		[0.96]	[-0.20]	[-1.61]	[-0.24]
CEO/Chair duality	-	-0.168	-0.169	-0.152	-0.169
		[-1.63]	[-1.63]	[-1.46]	[-1.63]
Competition	+	-0.308	-0.371	-0.266	-0.368
		[-0.62]	[-0.75]	[-0.53]	[-0.74]
Dual-class chares	+	1.719***	1.671***	1.661***	1.679***
		[3.95]	[3.84]	[3.79]	[3.85]
ChairDuality*OverCEO	+	0.370**	0.367**	0.326**	0.369**
		[2.49]	[2.46]	[2.19]	[2.47]
G_indexOverceo	-	-0.464***			
		[-3.24]			
HighG_indexOverCEO	-		-0.235***		-0.231***
			[-2.81]		[-2.68]
LowG_indexOverCEO	+			0.272	0.066
				[0.89]	[0.21]
SoxOverceo	-	0.233*	0.230*	0.202	0.231*
		[1.70]	[1.67]	[1.47]	[1.68]
DualClass*OverCEO	-	1.170***	1.235***	1.291***	1.229***
		[2.68]	[2.83]	[2.95]	[2.81]
CEOShareOwned*Overceo	+ or -	0.023	0.020	0.038	0.020
		[0.71]	[0.60]	[1.19]	[0.60]

Table 1.4B (continued)

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
CEOShareOwned	+	-0.011	-0.010	-0.015	-0.010
		[-0.39]	[-0.38]	[-0.54]	[-0.38]
Size	+ or -	0.346**	0.305*	0.361**	0.308*
		[2.15]	[1.88]	[2.23]	[1.89]
Growth in sales	-	-0.001	-0.000	-0.001	-0.000
		[-0.59]	[-0.36]	[-0.48]	[-0.37]
Sale to Assets	-	0.414*	0.385*	0.408*	0.388*
		[1.79]	[1.66]	[1.75]	[1.67]
Firm Age	+ or -	-0.016	-0.018	-0.020	-0.018
		[-0.29]	[-0.34]	[-0.36]	[-0.33]
CEO Age	-	0.015	0.068	0.010	0.067
		[0.04]	[0.18]	[0.03]	[0.18]
CAPX	+	-0.103	-0.096	-0.102	-0.096
		[-1.40]	[-1.30]	[-1.37]	[-1.30]
ROA	-	0.003	0.003	0.003	0.003
		[0.91]	[0.89]	[0.84]	[0.89]
Book Leverage (DAT)	-	0.276	0.307	0.321	0.305
		[0.70]	[0.78]	[0.81]	[0.77]
Adjusted R-Squared		0.5598	0.5586	0.5554	0.5586
Number of Cross Sections x Time Series Length		266 x 9	266 x 9	267 x 9	268 x 9

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

Table 1.5A. CEO overconfidence, firm innovation, and firm performance. Dependent variable is Tobin's Q. Tobin's q is market value divided by book assets (Villaloonga and Amit 2006). Pooled OLS regression results.

This table shows the results from pooled OLS regression using **Total citation count** as dependent variable and **G_Index*OverCEO**; **LowG_Index*OverCEO;** and **HighG_Index*OverCEO** as the key explanatory variables. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. **Low(High)G_Index*OverCEO** are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,771 observations.

VarName	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	3.915***	3.959***	3.865***	3.951***
		[11.002]	[10.872]	[11.009]	[10.975]
OverCeo	+	0.163***	0.166***	0.166***	0.166***
		[5.911]	[6.224]	[6.215]	[6.211]
Innovation	+	0.013**	0.009	0.012*	0.009
		[2.183]	[1.565]	[1.929]	[1.527]
OverCEO_Innovation	+	0.022**	0.018*	0.018*	0.017*
		[2.035]	[1.921]	[1.955]	[1.919]
OverCEO_Innovation_Gindex	-	-0.006			
		[-0.999]			
OverCEO_Innovation_HighGindex	-		-0.110***		-0.108***
			[-5.654]		[-5.336]
OverCEO_Innovation_LowGindex	+			0.042*	0.007
				[1.845]	[0.314]
CEOShareOwned	+	0.046***	0.044***	0.045***	0.044***
		[8.921]	[8.926]	[8.919]	[8.994]
CEOAge	-	-0.607***	-0.609***	-0.597***	-0.608***
		[-7.575]	[-7.692]	[-7.516]	[-7.741]
Competition	+	0.989***	0.992***	0.989***	0.992***
		[7.853]	[7.994]	[7.810]	[7.987]
Size	-	-0.055***	-0.054***	-0.055***	-0.054***
		[-6.246]	[-6.245]	[-6.266]	[-6.243]
Change in Sale to total assets	+	1.177***	1.107***	1.156***	1.104***
		[3.445]	[3.267]	[3.397]	[3.260]
Book Leverage (DAT)	-	-0.009***	-0.008***	-0.009***	-0.008***
		[-7.179]	[-7.047]	[-7.100]	[-7.022]
Adjusted R-squared		0.4092	0.4187	0.4103	0.4184

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

Table 1.5B: CEO overconfidence, firm innovation, and firm performance. Dependent variable is Tobin's Q. Fixed effects models

This table shows the results from fix two regression using **Total citation count** as dependent variable and **G_Index*OverCEO**; **LowG_Index*OverCEO;** and **HighG_Index*OverCEO** as the key explanatory variables. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. **Low(High)G_Index*OverCEO** are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,771 observations.

VarName	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	4.562***	4.508***	4.107***	4.375***
		[11.446]	[11.257]	[11.857]	[10.999]
OverCeo	+	0.150***	0.147***	0.129***	0.150***
		[7.284]	[7.149]	[7.227]	[7.373]
Innovation	+	0.014*	0.017**	0.015**	0.019**
		[1.807]	[2.249]	[2.314]	[2.516]
OverCEO_Innovation	+	0.050*	-0.012**	-0.010**	-0.012**
		[1.929]	[-2.036]	[-2.107]	[-2.056]
OverCEO_Innovation_Gindex	-	-0.029**			
		[-2.441]			
OverCEO_Innovation_HighGindex	-		0.046		0.045
			[1.349]		[1.319]
OverCEO_Innovation_LowGindex	+			0.145***	0.151***
				[5.533]	[5.016]
CEOShareOwned	+	0.019***	0.019***	0.015***	0.017***
		[4.115]	[4.116]	[3.572]	[3.540]
CEOAge	-	-0.257***	-0.252***	-0.188***	-0.234***
		[-3.554]	[-3.476]	[-3.004]	[-3.257]
Competition	+	0.434***	0.443***	0.283***	0.400***
		[4.629]	[4.716]	[3.465]	[4.281]
Size	-	-0.345***	-0.345***	-0.297***	-0.341***
		[-14.438]	[-14.391]	[-14.355]	[-14.323]
Change in Sale to total assets	+	0.052	0.084	0.047	0.073
		[0.314]	[0.505]	[0.328]	[0.443]
Book Leverage (DAT)	-	-0.001	-0.001	0.000	-0.001
		[-1.361]	[-1.410]	[0.756]	[-1.388]
Adjusted R-squared		0.8676	0.8672	0.8360	0.8697
Observations		326 x 9	326 x 9	326 x 9	326 x 9

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

Table 1.6A. CEO overconfidence, firm innovation and firm performance. Dependent variable is ROA. (Pooled OLS regressions)

This table shows the results from pooled OLS regressions using **Total citation count** as dependent variable and **Innovation** which is measured by logarithm transformation of TotalCitation; **G_Index*OverCEO**; **LowG_Index*OverCEO;** and **HighG_Index*OverCEO** as the key explanatory variables. Dependent variable is **Lead ROA** which is Income Before Extraordinary Items divided by Total Assets. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. **Low(High)G_Index*OverCEO** are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,771 observations.

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	0.060***	0.060***	0.059***	0.059***
		[8.943]	[8.635]	[8.780]	[8.601]
OverCeo	+ or -	-0.001	-0.001	-0.001*	-0.001*
		[-1.312]	[-1.551]	[-1.792]	[-1.762]
Innovation	+	0.001***	0.001***	0.0002**	0.0004**
		[3.080]	[2.555]	[2.328]	[2.459]
OverCEO_Innovation	+	0.011***	0.0001	0.0001	
		[3.958]	[0.712]	[0.504]	
OverCEO_Innovation_Gindex	-	-0.005***			
		[-3.567]			
OverCEO_Innovation_HighGindex	-		-0.001*		-0.000
			[-1.899]		[-0.174]
OverCEO_Innovation_LowGindex	+			0.004***	0.004***
				[4.460]	[3.827]
Competition	+	0.061***	0.061***	0.060***	0.060***
		[5.459]	[5.434]	[5.459]	[5.451]
Size	+ or -	-0.007***	-0.007***	-0.007***	-0.007***
		[-8.706]	[-8.655]	[-8.649]	[-8.694]
SaleToAssets	+	0.003*	0.003*	0.003*	0.003*
		[1.676]	[1.738]	[1.814]	[1.826]
Adjusted R-Squared		0.2873	0.2872	0.2932	0.2932
Observations		1711	1711	1711	1711

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

Table 1.6B. CEO overconfidence, firm innovation, and firm performance. Dependent variable is Lead ROA. (fixed effects models)

This table shows the results from fixed effects models (fix two) using **Lead ROA** as dependent variable and **Innovation** which is measured by logarithm transformation of TotalCitation; **OverCEO*Innovation*G_Index**; **OverCEO*Innovation*HighG_Index**; and **OverCEO*Innovation*LowG_Index** as the key explanatory variables. Dependent variable is **Lead ROA** which is Income Before Extraordinary Items divided by Total Assets. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. **OverCEO*Innovation*Low(High)G_Index** are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 326 cross sections and 9 time series.

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	0.057***	0.057***	0.056***	0.056***
		[4.049]	[4.011]	[3.990]	[4.100]
OverCeo	+ or -	< -0.001	< -0.001	< -0.001	< -0.001
		[0.291]	[-0.115]	[-0.022]	[-0.052]
Log_Totalcitation	+	< -0.001	< -0.001*	< -0.001	< -0.001*
		[-1.360]	[-1.665]	[-1.620]	[-1.665]
OverCEO_Innovation	+	< -0.001	< -0.001	< -0.001	
		[0.175]	[-0.297]	[-0.153]	
OverCEO_Innovation_Gindex	-	< -0.001			
		[-0.312]			
OverCEO_Innovation_HighGindex	-		< -0.001		< -0.001
			[-0.086]		[-0.108]
OverCEO_Innovation_LowGindex	+			0.004***	0.004***
				[3.017]	[3.031]
Competition	+	0.016***	0.016***	0.015***	0.015***
		[3.629]	[3.623]	[3.366]	[3.380]
Size	+ or -	-0.007***	-0.007***	-0.007***	-0.007***
		[-5.356]	[-5.307]	[-5.246]	[-6.090]
SaleToAssets	+	0.002	0.002	0.002	0.002
		[1.056]	[1.065]	[0.970]	[0.987]
Adjusted R-Squared		0.8313	0.8317	0.8328	0.8328
Observations		326 x 9	326 x 9	326 x 9	326 x 9

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

Table 1.7A. CEO overconfidence, firm innovation, and firm performance. Dependent variable is Lead Sales growth (Pooled OLS regressions)

This table shows the results from pooled OLS regressions using **Total citation count** as dependent variable and **G_Index*OverCEO**; **LowG_Index*OverCEO;** and **HighG_Index*OverCEO** as the key explanatory variables. Dependent variable is **Lead Sales growth** which is a logarithm transformation of sales *divided by* the previous year value of sales *minus* one. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. **Low(High)G_Index*OverCEO** are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,771 observations.

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	0.048**	0.047**	0.047**	0.047**
		[2.506]	[2.455]	[2.457]	[2.454]
OverCeo	+	0.009***	0.009***	0.009***	0.009***
		[3.587]	[3.575]	[3.586]	[3.586]
Totalcitation	+	0.001***	0.001***	0.001***	0.001***
		[4.510]	[4.517]	[4.508]	[4.511]
OverCEO_Innovation	+	0.012**	-0.001***	-0.002**	-0.002**
		[2.423]	[-2.631]	[-2.143]	[-2.164]
OverCEO_Innovation_Gindex	-	-0.007***			
		[-2.617]			
OverCEO_Innovation_HighGindex	-		-0.001		<0.0001
			[-0.807]		[-0.903]
OverCEO_Innovation_LowGindex	+			0.001	0.001
				[1.387]	[1.377]
DualTitle	+ or -	-0.006**	-0.006**	-0.006**	-0.006**
		[-2.117]	[-2.174]	[-2.151]	[-2.142]
Competition	+	0.017	0.017	0.017	0.017
		[1.599]	[1.579]	[1.574]	[1.574]
Size	+	-0.005***	-0.005***	-0.005***	-0.005***
		[-3.664]	[-3.653]	[-3.647]	[-3.648]
FirmAge	-	-0.001*	-0.001*	-0.001*	-0.001*
		[-1.860]	[-1.876]	[-1.850]	[-1.854]
CEOAge	-	<0.0001	<0.0001	<0.0001	<0.0001
		[-0.029]	[0.015]	[0.013]	[0.014]

Table 1.7A. (continued)

Variable	Expected signs	Model 1	Model 2	Model 3	Model 4
CAPX	+	0.001	<0.0001	0.001	0.001
		[0.529]	[0.491]	[0.510]	[0.509]
Adjusted R-squared		0.0875	0.0874	0.0882	0.0878

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

Table 1.7B. CEO overconfidence, firm innovation, and firm performance. Dependent variable is Lead Salesgrowth. (fixed effects models)

This table shows the results from fixed effects models (fix two) using **Lead Sales growth** as dependent variable and **G_Index*OverCEO**; **LowG_Index*OverCEO;** and **HighG_Index*OverCEO** as the key explanatory variables. Dependent variable is **Lead Sales growth** which is a logarithm transformation of sales divided by the previous year value of Sales minus one.
OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. **Low(High)G_Index*OverCEO** are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 326 cross sections and 9 time series.

VarName	Expected signs	Model 1	Model 2	Model 3	Model 4
Intercept	+ or -	-94.873*	-95.285*	-95.842*	-95.938*
		[-1.651]	[-1.658]	[-1.669]	[-1.670]
OverCeo	+	8.247**	8.229**	8.370**	8.380**
		[2.185]	[2.181]	[2.218]	[2.220]
Totalcitation	+	0.456	0.425	0.223	0.228
		[0.264]	[0.246]	[0.129]	[0.131]
OverCEO_Innovation	+	6.689	-0.982	-4.979	-4.867
		[0.376]	[-0.521]	[-1.309]	[-1.260]
OverCEO_Innovation_Gindex	-	-4.087			
		[-0.435]			
OverCEO_Innovation_HighGindex	-		-2.473		-1.101
			[-0.385]		[-0.322]
OverCEO_Innovation_LowGindex	+			2.471	2.407
				[1.203]	[1.152]
DualTitle	+ or -	2.122	2.093	2.306	2.347
		[0.495]	[0.489]	[0.539]	[0.547]
Competition	-	-86.725***	-86.538***	-88.272***	-88.115***
		[-5.957]	[-5.938]	[-6.046]	[-6.021]
Size	+	6.289	6.233	6.407	6.4
		[1.462]	[1.450]	[1.490]	[1.488]
FirmAge	-	-1.467	-1.499	-1.467	-1.493
		[-0.838]	[-0.854]	[-0.839]	[-0.851]
CEOAge	-	5.311	5.509	5.344	5.376

Table 1.7B. (continued)

VarName	Expected signs	Model 1	Model 2	Model 3	Model 4
		[0.474]	[0.492]	[0.477]	[0.480]
LogCAPX	+	14.431***	14.447***	14.401***	14.389***
		[6.240]	[6.250]	[6.235]	[6.224]
Adjusted R-squared		0.4311	0.4303	0.4302	0.4324
Observations		326 x 9	326 x 9	326 x 9	326 x 9

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

ROBUSTNESS TEST

Table 1.8A. Descriptive Statistics – Patent count models

Variable	N	Maximum	Minimum	Mean	Median	Std Dev
Patentcount	1711	4,340.00	1.00	80.57	13.00	269.16
OverCeo	1711	1.00	0.00	0.34	0.00	0.47
Firmage	1711	57.00	1.00	32.18	32.00	18.86
CEOage	1711	89.00	35.00	55.84	56.00	7.24
Size	1711	750,507.00	89.15	13,917.39	3,346.65	47,525.58
CAPX	1711	33,143.00	0.63	663.13	139.90	2,307.61
ROA	1711	48.15	(290.84)	5.26	5.94	11.42
DAT	1711	144.04	0.00	23.10	22.77	16.61
L_index	1711	1.03	0.60	0.92	0.92	0.06
Dual class	1711	1.00	0.00	0.07	0.00	0.25
SOX	1711	1.00	0.00	0.37	0.00	0.48
Tobinq	1711	27.09	0.81	2.52	1.88	1.99
SALECHG	1711	418.82	(66.03)	11.22	8.46	25.57

Table 1.8B. Pearson Correlation and p-value – Patent count models

Pearson Correlation Coefficients											
Prob > |r| under H0: Rho=0											
	Patent count	Over Ceo	Dual Title	Compe_ _tition	Dual Class	Size	Firm Age	CEO_ Age	CAPX	ROA	DAT
Patentcount	1										
OverCeo	0.095	1.000									
	<.0001										
Dual Title	0.055	-0.031	1.000								
	0.023	0.194									
Competition	-0.035	-0.059	-0.013	1.000							
	0.145	0.015	0.584								
Dual Class	0.007	0.010	0.053	0.047	1.000						
	0.772	0.676	0.027	0.052							
Size	0.318	-0.074	0.228	-0.042	0.060	1.000					
	<.0001	0.002	<.0001	0.081	0.013						
Firmage	0.072	-0.157	0.167	0.131	-0.038	0.322	1.000				
	0.003	<.0001	<.0001	<.0001	0.117	<.0001					
CEOage	-0.021	0.024	0.273	-0.077	-0.001	0.065	0.069	1.000			
	0.381	0.321	<.0001	0.002	0.983	0.007	0.004				
CAPX	0.267	-0.023	0.047	-0.024	0.196	0.523	0.147	0.020	1.000		
	<.0001	0.351	0.054	0.317	<.0001	<.0001	<.0001	0.409			
ROA	0.000	0.184	0.075	-0.028	0.021	0.051	0.059	0.044	0.001	1.000	
	0.996	<.0001	0.002	0.239	0.388	0.034	0.015	0.071	0.983		
DAT	-0.007	-0.154	0.145	0.002	0.004	0.193	0.195	0.063	0.151	-0.251	1.00
	0.788	<.0001	<.0001	0.921	0.864	<.0001	<.0001	0.009	<.0001	<.0001	

Table 1.9A. Relation between firm innovation and CEO overconfidence (Pooled OLS regressions). Dependent variable is Patent Count and G_index is the measure of corporate governance

This table shows the results from pooled OLS regression using LogPatentcount as dependent variable and G_Index*OverCEO; LowG_Index*OverCEO; HighG_Index*OverCEO and SOX*OverCEO as the key explanatory variables. Dependent variable is firm innovation proxied by LogPatentcount which is now calculated by logarithm transformation of number of Patent grouped by "GVKEY" and "Year Patent applied for" in NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index and SOX*OverCEO all are interactions of two categorized variables between an indicator variable of OverCEO variable and the interacted variables. Low(High)G_Index*OverCEO are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,711 observations.

Variable	Expected signs	MODEL1	MODEL2	MODEL3	MODEL4
Intercept		0.357*	0.398**	0.322	0.427**
		[1.794]	[2.001]	[1.614]	[2.149]
OverCeo	+	0.245***	0.100***	0.097***	0.098***
		[6.221]	[6.770]	[6.544]	[6.646]
G_indexOverceo	-	-0.015***			
		[-3.940]			
HighLogG_indexOverCEO	-		-0.046***		
			[-3.361]		
LowLogG_indexOverCEO	+			0.064***	
				[4.485]	
G_index	-				-0.009***
					[-3.975]
SoxOverceo	-	-0.117***	-0.120***	-0.117***	-0.118***
		[-5.365]	[-5.520]	[-5.363]	[-5.440]
CEOShareOwned		0.004	0.004	0.003	0.003
		[1.359]	[1.365]	[1.006]	[1.192]
Size		0.006	0.007	0.008	0.008
		[0.649]	[0.711]	[0.806]	[0.770]
SaleToAssets		-0.063***	-0.064***	-0.060***	-0.059***
		[-4.850]	[-4.883]	[-4.552]	[-4.528]
FirmAge		0.006	0.006	0.004	0.006
		[0.862]	[0.853]	[0.622]	[0.936]
CEOAge		-0.124***	-0.131***	-0.121***	-0.123***
		[-2.682]	[-2.827]	[-2.626]	[-2.654]
CAPX		0.052***	0.051***	0.050***	0.051***
		[5.864]	[5.740]	[5.619]	[5.666]

Table 1.9A. (continued)

Variable	Expected signs	MODEL1	MODEL2	MODEL3	MODEL4
Book leverage (DAT)		-0.110***	-0.106***	-0.102**	-0.099**
		[-2.683]	[-2.563]	[-2.485]	[-2.394]
Competition		0.220**	0.230**	0.205**	0.225**
		[2.177]	[2.278]	[2.036]	[2.231]
Adjusted R-squared		0.1626	0.1605	0.1648	0.1627

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

Table 1.9B. Relation between firm innovation and CEO overconfidence (fixed effects models). Dependent variable is Patent Count and G_index is the measure of corporate governance

This table shows the results from fixed effects models (fix two) using LogPatentcount as dependent variable and G_Index*OverCEO; LowG_Index*OverCEO; HighG_Index*OverCEO and SOX*OverCEO as the key explanatory variables. Dependent variable is firm innovation proxied by LogPatentcount which is now calculated by logarithm transformation of number of Patent grouped by "GVKEY" and "Year Patent applied for" in NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index; DualityTitle*OverCEO; Dualclass*OverCEO; SOX*OverCEO and CEOShareOwnership*OverCEO all are interactions of two categorized variables between an indicator variable of OverCEO variable and the interacted variables. Institutional share ownership (%) is percentage of common stocks to total outstanding common shares held by an institutional investor. CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 324 cross sections x 9 time series.

VarName	Expected signs	Model1	Model2	Model3	Model4
Intercept		-0.920***	-0.960***	-0.879***	-1.403***
		[-2.988]	[-3.098]	[-2.842]	[-4.356]
OverCeo	+	0.274***	0.054***	0.052***	0.051***
		[3.639]	[4.064]	[3.951]	[4.485]
LogG_indexOverceo	-	-0.100***			
		[-2.975]			
HighLogG_indexOverCEO	-		0.024		
			[0.940]		
LowLogG_indexOverCEO	+			0.050**	
				[2.191]	
LogG_index	-				-0.230***
					[-4.593]
SoxOverceo	-	0.014	0.008	0.008	0.008
		[0.707]	[0.395]	[0.419]	[0.365]
CEOShareOwned		0.004	0.004	0.005	0.005
		[1.071]	[1.158]	[1.407]	[1.324]
Size		0.078***	0.080***	0.078***	0.074***
		[3.318]	[3.388]	[3.329]	[3.159]
SaleToAssets		0.062*	0.063**	0.063**	0.062**
		[1.958]	[1.968]	[1.975]	[1.984]
FirmAge		-0.019**	-0.020***	-0.020***	-0.020***
		[-2.553]	[-2.663]	[-2.670]	[-2.773]
CEOAge		0.040	0.040	0.031	0.027
		[0.730]	[0.737]	[0.576]	[0.500]
CAPX		-0.007	-0.006	-0.005	-0.004

Table 1.9B. (continued)

VarName	Expected signs	Model1	Model2	Model3	Model4
		[-0.596]	[-0.489]	[-0.414]	[-0.379]
Book leverage (DAT)		0.004	-0.001	-0.005	-0.010
		[0.074]	[-0.014]	[-0.077]	[-0.173]
Competition		-0.187**	-0.172**	-0.159**	-0.151**
		[-2.495]	[-2.288]	[-2.106]	[-2.018]
Adjusted R-Squared		0.7596	0.7581	0.7588	0.7617
Observations		324 x 9	324 x 9	324 x 9	324 x 9

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

Table 1.10A. CEO overconfidence, firm innovation and firm performance. Dependent variable is Lead Tobin's Q. Tobin's q is market value divided by book assets (Villaloonga and Amit 2006). Pooled OLS regressions

This table shows the results from pooled OLS regression with year dummies using Tobin's Q as dependent variable and OverCEO*Patentcount*G_Index; verCEO*Patentcount*HighG_Index; and OverCEO*Patentcount*LowG_Index as the key explanatory variables. LogPatentcount is measured by logarithm transformation of number of Patent grouped by "GVKEY" and "Year Patent applied for" in NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. OverCEO*Patentcount*Low(High)G_Index are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintile). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,771 observations.

Variable	Expected signs	MODEL1	MODEL2	MODEL3	MODEL4
Intercept		1.101***	1.147***	1.093***	1.102***
		[8.696]	[6.959]	[8.625]	[8.670]
OverCeo	+	0.119***	0.225***	0.224***	0.100**
		[3.006]	[9.551]	[9.430]	[2.507]
Patentcount	+	0.049***	0.061***	0.061***	0.046***
		[6.434]	[8.832]	[8.814]	[6.097]
OverCEO_patentcount_Gindex	+ or -	0.018***			
		[3.222]			
OverCEO_patentcount_HighGindex	+ or -		-0.135***		
			[-6.429]		
OverCEO_patentcount_LowGindex	+ or -			0.100***	
				[3.725]	
OverCEO_patentcount	+				0.046***
					[3.704]
Size		-0.059***	-0.059***	-0.062***	-0.059***
		[-3.318]	[-3.402]	[-3.440]	[-3.332]
CAPX		-0.010	-0.010	-0.008	-0.010
		[-0.716]	[-0.686]	[-0.564]	[-0.691]
ROA		0.007**	0.008**	0.008**	0.007**
		[2.035]	[2.097]	[2.046]	[2.035]
Book leverage (DAT)		-0.008***	-0.008***	-0.008***	-0.008***
		[-5.511]	[-5.191]	[-5.186]	[-5.481]
Competition		-0.391***	-0.354***	-0.396***	-0.384***
		[-2.880]	[-2.588]	[-2.930]	[-2.844]
Adjusted R-Squared		0.3333	0.344	0.3366	0.3345

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

Table 1.10B. CEO overconfidence, firm innovation, and firm performance. Dependent variable is Lead Tobin's Q. Tobin's q is market value divided by book assets (Villaloonga and Amit 2006). Fixed effects models

This table shows the results from fixed effects models (fix two) using Tobin's Q as dependent variable and OverCEO*Patentcount*G_Index; OverCEO*Patentcount*HighG_Index; and OverCEO*Patentcount*LowG_Index as the key explanatory variables. LogPatentcount is measured by logarithm transformation of number of Patent grouped by "GVKEY" and "Year Patent applied for" in NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. OverCEO*Patentcount*Low(High)G_Index are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 324 cross sections and 9 time series.

VarName	Expected signs	Model1	Model2	Model3	Model4
Intercept		3.227***	3.190***	3.163***	3.191***
		[11.876]	[11.711]	[11.760]	[11.619]
OverCeo	+	0.074**	0.071**	0.072**	0.066**
		[2.444]	[2.353]	[2.441]	[2.178]
Patentcount	+	0.051*	0.017**	0.017**	0.018**
		[1.933]	[2.058]	[2.095]	[2.186]
OverCEO_patentcount_Gindex	+ or -	-0.016			
		[-1.365]			
OverCEO_patentcount_HighGindex	+ or -		0.050		
			[1.447]		
OverCEO_patentcount_LowGindex	+ or -			0.164***	
				[5.491]	
OverCEO_patentcount	+				-0.008
					[-0.715]
Size		-0.340***	-0.342***	-0.331***	-0.338***
		[-12.493]	[-12.528]	[-12.268]	[-12.354]
CAPX		0.016	0.017	0.014	0.017
		[1.079]	[1.132]	[0.978]	[1.168]
ROA		0.003***	0.003***	0.003***	0.003***
		[3.689]	[3.675]	[3.871]	[3.676]
Book leverage (DAT)		-0.001	-0.001	-0.001	-0.001
		[-1.201]	[-1.255]	[-1.125]	[-1.211]
Competition		0.301***	0.310***	0.252**	0.303***
		[2.925]	[3.016]	[2.474]	[2.943]
Adjusted R-Squared		0.8662	0.8662	0.869	0.866

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

Table 1.11A. CEO overconfidence, firm innovation, and firm performance. Dependent variable is Lead ROA. Pooled OLS regressions

This table shows the results from pooled OLS regression with year dummies using Lead ROA as dependent variable and LogPatentCount; OverCEO*Patentcount*G_Index; OverCEO*Patentcount*HighG_Index; and OverCEO*Patentcount*LowG_Index as the key explanatory variables. Dependent variable is Lead ROA which is Income Before Extraordinary Items divided by Total Assets. LogPatentcount is measured by logarithm transformation of number of Patent grouped by "GVKEY" and "Year Patent applied for" in NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. OverCEO*Patentcount*Low(High)G_Index are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintile). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,771 observations.

Variable	Expected signs	MODEL1	MODEL2	MODEL3	MODEL4
Intercept		0.060***	0.060***	0.059***	0.060***
		[8.015]	[7.733]	[7.880]	[8.024]
OverCeo	+	0.005***	0.002	0.002	0.004***
		[2.813]	[1.618]	[1.475]	[2.656]
Log_Patentcount	+	< 0.001*	< 0.001	< 0.001	< 0.001
		[1.738]	[0.307]	[0.084]	[1.576]
OverCEO_logpatentcount_Gindex	-	-<0.001***			
		[-2.793]			
OverCEO_patentcount_HighGindex	-		-0.002**		
			[-2.458]		
OverCEO_patentcount_LowGindex	+			0.005***	
				[4.630]	
OverCEO_logpatentcount	+				-0.001**
					[-2.411]
Size		-0.007***	-0.007***	-0.007***	-0.007***
		[-8.152]	[-8.069]	[-8.099]	[-8.145]
SaleToAssets		-0.001	-0.001	-0.001	-0.001
		[-1.010]	[-0.981]	[-0.694]	[-1.025]
CAPX		0.002*	0.001*	0.001*	0.002*
		[1.779]	[1.698]	[1.706]	[1.763]
Competition		-0.013***	-0.013***	-0.015***	-0.014***
		[-3.175]	[-3.065]	[-3.375]	[-3.188]
Adjusted R-Squared		0.1698	0.1697	0.1776	0.1693

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

Table 1.11B. CEO overconfidence and Firm Performance. Dependent variable is Lead ROA. Fixed effects models

This table shows the results from fixed effects models using Lead ROA as dependent variable and LogPatentCount; OverCEO*Patentcount*G_Index; OverCEO*Patentcount*HighG_Index; and OverCEO*Patentcount*LowG_Index as the key explanatory variables. Dependent variable is Lead ROA which is Income Before Extraordinary Items divided by Total Assets. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. OverCEO*Patentcount*Low(High)G_Index are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 326 cross sections and 9 time series.

VarName	Expected signs	Model1	Model2	Model3	Model4
Intercept		31.274***	31.006***	31.218***	31.315***
		[3.268]	[3.238]	[3.278]	[3.273]
OverCeo	+	0.920	1.201**	1.237***	0.951
		[1.008]	[2.570]	[2.655]	[1.037]
Log_Patentcount	+	-0.486	-0.461	-0.423	-0.483
		[-1.500]	[-1.458]	[-1.343]	[-1.490]
OverCEO_Logpatentcount_Gindex	-	0.038			
		[0.343]			
OverCEO_patentcount_HighGindex	-		0.715		
			[0.690]		
OverCEO_patentcount_LowGindex	+			2.741***	
				[2.998]	
OverCEO_Logpatentcount	+				0.075
					[0.301]
Size		-4.008***	-4.057***	-3.939***	-4.012***
		[-4.297]	[-4.348]	[-4.240]	[-4.303]
SaleToAssets		8.094***	8.115***	7.978***	8.095***
		[6.588]	[6.606]	[6.513]	[6.588]
CAPX		-2.130***	-2.145***	-2.182***	-2.133***
		[-4.624]	[-4.671]	[-4.764]	[-4.635]
Competition		15.350***	15.357***	14.579***	15.336***
		[5.252]	[5.258]	[4.992]	[5.249]
Adjusted R-Squared		0.5965	0.5966	0.5992	0.5965
Observations		326 x 9	326 x 9	326 x 9	326 x 9

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

Table 1.12A: CEO overconfidence, firm innovation, and firm performance. Dependent variable is Lead SalesGrowth. Pooled OLS regressions

This table shows the results from pooled OLS regressions using Lead SaleGrowth as dependent variable and LogPatentCount; OverCEO*Patentcount*G_Index; OverCEO*Patentcount*HighG_Index; and OverCEO*Patentcount*LowG_Index as the key explanatory variables. Dependent variable is Lead Sales growth which is a logarithm transformation of sales divided by the previous year value of Sales minus one. LogPatentcount is measured by logarithm transformation of number of Patent grouped by "GVKEY" and "Year Patent applied for" in NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. OverCEO*Patentcount*Low(High)G_Index are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintitle). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 1,771 observations.

Variable	Expected signs	MODEL1	MODEL2	MODEL3	MODEL4
Intercept		1.526***	1.516***	1.559***	1.186***
		[11.205]	[10.171]	[11.530]	[7.249]
OverCeo	+	0.046*	0.041*	0.042*	0.043*
		[1.908]	[1.721]	[1.783]	[1.812]
OverCEO_patentcount	+	0.599**	-0.081	-0.075	-0.075
		[2.482]	[-1.634]	[-1.478]	[-1.457]
OverCEO_patentcount_Gindex	-	-0.361***			
		[-2.891]			
OverCEO_patentcount_HighGindex	-		0.071***		
			[3.133]		
OverCEO_patentcount_LowGindex	+			-0.090***	
				[-3.364]	
LogPatentCount	+				0.160***
					[4.620]
CEOShareOwned		0.010*	0.010**	0.012**	0.012**
		[1.876]	[2.027]	[2.260]	[2.337]
Size		0.778***	0.776***	0.778***	0.776***
		[35.120]	[35.294]	[35.676]	[35.737]
CAPX		0.173***	0.172***	0.171***	0.172***
		[8.645]	[8.676]	[8.653]	[8.725]
Competition		3.320***	3.307***	3.332***	3.293***
		[15.519]	[15.323]	[15.664]	[15.399]
Adjusted R-Squared		0.9081	0.9084	0.9086	0.9091

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

Table 1.12B: CEO overconfidence, firm innovation, and firm performance. Dependent variable is Lead SalesGrowth. Fixed effects models.

This table shows the results from fixed effects models (fix two) using Lead SaleGrowth as dependent variable and LogPatentCount; OverCEO*Patentcount*G_Index; OverCEO*Patentcount*HighG_Index; and OverCEO*Patentcount*LowG_Index as the key explanatory variables. Dependent variable is Lead Sales growth which is a logarithm transformation of sales divided by the previous year value of Sales minus one. LogPatentcount is measured by logarithm transformation of number of Patent in NBER Patent database files. OverCEO is an indicator variable of overconfident CEO which equals to one for all years after the CEO holds options that are at least 67% in-the-money. OverCEO*G_Index; OverCEO*G_Index is interaction of two categorized variables between an indicator variable of OverCEO and the interacted variable of G_index. OverCEO*Patentcount*Low(High)G_Index are interaction variables in which the natural logarithm of G_index is less than 1st quintile (greater than 3rd quintile). CEO_shares_ownership is stock owned by the CEO, excluding options, Execucomp. Size is natural logarithm of total assets. Insider share ownership (%) is percentage of common stocks to total outstanding common shares held by CEO. ROA is return on assets. Book leverage is total debt to book value of total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1998 through 2006. The sample included 326 cross sections and 9 time series.

VarName	Expected signs	Model1	Model2	Model3	Model4
Intercept		4.671***	4.675***	4.616***	4.717***
		[20.591]	[20.560]	[20.495]	[20.648]
OverCeo	+	0.042***	0.046***	0.048***	0.044***
		[2.996]	[3.446]	[3.653]	[3.334]
OverCEO_patentcount	+	-0.215	0.053**	0.058**	0.050*
		[-0.705]	[2.009]	[2.245]	[1.912]
OverCEO_patentcount_Gindex	-	0.145			
		[0.881]			
OverCEO_patentcount_HighGindex	-		-0.003		
			[-0.094]		
OverCEO_patentcount_LowGindex	+			0.121***	
				[4.826]	
Log_patentcount	+				0.013
					[1.529]
CEOShareOwned		0.003	0.002	0.001	0.002
		[0.685]	[0.677]	[0.163]	[0.664]
Size		0.407***	0.407***	0.413***	0.405***
		[18.511]	[18.451]	[18.900]	[18.378]
CAPX		0.028**	0.028**	0.026**	0.027**
		[2.279]	[2.256]	[2.102]	[2.228]
Competition		0.666***	0.663***	0.631***	0.670***
		[8.524]	[8.485]	[8.123]	[8.572]
Adjusted R-Squared		0.9899	0.9899	0.9901	0.9899
Observations		326 x 9	326 x 9	326 x 9	326 x 9

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

ESSAY 2

BOOK-TAX INCOME DIFFERENCES: A NEW MEASURE OF EARNINGS MANAGEMENT

2.1 INTRODUCTION

Corporate income is calculated twice each year for two external reporting purposes. The first is for reporting firm performance to stakeholders under Generally Accepted Accounting Principles (GAAP) and the second is for determining tax obligations according to the Internal Revenue Code (IRC). The use of two different sets of accounting rules in preparing financial statements and tax returns has led to differences between book income and taxable income. The U.S. Department of the Treasury reported in 1999 that book-tax differences (BTD) had increased significantly throughout the 1990s. Recent studies confirm that the divergence between book income and taxable income continues to be a common phenomenon in the corporate sector (Yin 2003; Hanlon 2005; Desai and Dharmapala 2009; Atwood, Drake and Myers 2010).

Book-tax differences can arise due to different requirements for the timing of recognition of income and expense items under different rules. GAAP allows managers discretion in their choice of accounting procedures for the purpose of making accounting information more informative. Tax regulations, however, are less flexible and deferred revenue does not exist under the IRC. On the other hand, recent academic literature suggests that book-tax differences are likely related to other reasons. First, some researchers suggest that book-tax differences exist as a result of earnings management. Joos et al. (2000) find evidence that the correlation between earnings and stock return weakens when book-tax differences are large; they argue that investors consider large book-tax differences indicative of opportunistic firm behavior and thus respond less to earnings. Phillips et al. (2003) find that deferred tax expense provides information about earnings management activities. Lev and Nissim (2004) observe that book-

tax differences are related to subsequent earnings growth and are thus correlated with earnings management. Palepu et al. (2005) suggests that abnormal book-tax differences indicate worsening earnings quality. Second, it has been argued that book-tax differences exist as firms use tax-planning strategies to defer taxes to reduce the present value of the taxes paid. Desai and Dharmapala (2009) develop a model in which opportunistic managers act as residual claimants on corporate cash flows and have incentives to avoid tax payments.

Despite the frequently alleged relation between book-tax differences and earnings management, few attempts have been made to develop a measure of earnings management based on the characteristics of book-tax differences. To fill this void, I develop a simple model that measures earnings management directly from book-tax differences. In addition, I am also motivated to make this investigation due to the concern of the adequacy of conventional measures of earnings management. Researchers have typically relied on accounting accruals as a measure of earnings management. In a survey of the literature on earnings management, Dechow et al. (2010) find considerable conflicts among reported results when earnings management is measured by accruals.

The earnings management measure I develop in this study is a comprehensive measure that captures taxable income related earnings management in addition to the conventional book income related accruals management. To confirm the adequacy of the new measure of earnings management developed in this study, I revisit several earnings management related issues previously investigated in the literature to see if the new measure performs better than conventional measures. The issues I re-examine include:

1. Executive stock option exercises - Insiders have incentives to use private information about forthcoming earnings to time their stock option exercises. Conflicting results have been documented by Bartov (2004), Efendi (2007) and Armstrong et al. (2009). My new measure that captures both income tax related and book income related earnings management may provide better insights.

2. Firm credit ratings – Earnings management has led to downward revisions of firm credit ratings because credit analysts are able to see through the information content of earnings management (Ayers et al. 2009). The book-tax earnings management measure I develop can provide additional information to credit analysts.
3. Firm Value and earnings management - Outside investors are in general unable to fully comprehend the information underlying earnings management. The new book-tax earnings management measure I develop may help investors respond more correctly as the measure incorporates more information.

The following is a brief preview of the results that I have found in this study.

1. Executive stock option exercises are significantly affected by earnings management. My results show that taxable income related earnings management also plays a role in influencing executive stock option exercises. My results also show that executives time their stock option exercises regardless of the source of earnings management.
2. Rating agencies downgrade a firm's credit worthiness when there is evidence of earnings management. However, for firms that are considered high tax-planning firms and have poor earnings quality, credit analysts can decipher additional information from taxable income despite firm performance is masked by poor earnings quality. My results show that credit analysts react favorably to tax savings associated with tax planning activity when other information is obscured by earnings management.
3. My new measure of earnings management shows results consistent with the extant literature that outside investors are unable to comprehend the information underlying earnings management and they respond with a positive bias in the current year. My results also show that once investors decipher the information of earnings management, they correct their errors in the following time periods.

My major contribution to the literature is the new approach of measuring earnings management from book-tax differences. The new measure reflects both

taxable income related earnings management and the typical book income accruals earnings management. As a result, the measure is more powerful in explaining firm behaviors that are not documented previously. Moreover, given the inconsistent results in existing literature when earnings management is measured by accruals, my new measure of earnings management may help resolve unexplainable conflicting results previously reported. My study adds to the strand of literature on the measurement of earnings management. Facing constantly changing accounting rules and tax regulations, firms have adeptly revised their methods of earnings management regularly. My investigation opens a new channel to understanding corporate earnings management and shows the importance to have a comprehensive view of earnings management than the conventional focus on book income accruals management alone.

2.2 LITERATURE REVIEW

2.2.1 Book-Tax Differences

Tax and financial reporting rules allow for differences in the timing of revenue and expense recognition. For example, for tax purposes, depreciation is generally calculated using an accelerated method so that in the early years of an asset's life, taxable income is lower than income for financial reporting purposes. The benefit of using accelerated depreciation for tax purposes is equal to the present value of the accelerated deductions versus those that would result from the use of straight line depreciation. A difference between book income and taxable income can also arise when revenue or expense is recognized under one system but not the other. For example, interest on municipal bonds and a portion of dividends received from other corporations generally are excluded from the calculation of a corporation's taxable income, but considered income for financial reporting purposes. Book-tax differences can also arise for firms involved in foreign trade when the firms reduce tax obligations through transfer pricing or cross-border dividend capture. These types of foreign activity related book-tax differences are permanent in nature and do not give rise to deferred tax assets or liabilities and related expenses.

Aside from the differences between GAAP and IRC, a book-tax gap exists when either book income is raised by earnings management and/or taxable income is reduced by tax sheltering (planning) activity. Despite it is conventionally believed that tax sheltering activity can reduce tax obligations and benefit shareholders, the evidence in academic literature suggests a different picture. Several researchers find that investors react negatively to disclosure of tax sheltering activity by corporations (Desai and Hines 2002; Erickson, Hanlon and Maydew 2004; Hanlon and Slemrod 2008). Desai and Dharmapala (2009) argue that when corporate governance is weak, opportunistic managers may have incentives to avoid tax obligations even if the activity is costly to the firm.

A major debate on the issue of book-tax differences focuses on the desirability of book-tax conformity. Those who support tightening discretion in financial reporting argue that higher book-tax conformity (smaller book-tax differences) will increase tax compliance and reduce abusive tax sheltering and opportunistic financial reporting, and thus improve earnings quality (Desai 2005, Whitaker 2006; Desai and Dharmapala 2009). However, opponents of higher book-tax conformity have reported considerable empirical evidence that higher book-tax conformity reduces earnings quality. For example, Hanlon, Maydew and Shevlin (2008) report that increased conformity results in less informative earnings. Atwood et al. (2010) find that earnings have lower persistence and a lower correlation with future cash flows when conformity is higher. For now, the debate on book-tax conformity is continuing and the result inconclusive.

2.2.2. Earnings Management

Prior research finds that investors do not fully comprehend the lower persistence of the accruals component of earnings; thus stock price movements can be influenced by accruals management (Richardson et al. 2005; Hanlon 2005). Sloan (1996) also finds that investors do not react correctly to earnings accruals information instantaneously. The extant literature has also shown that earnings management is prevalent in the business sector. Earnings management has been related to corporate events such as acquisitions (Erickson and Wang 1997; Louis 2004), seasoned equity offerings (Jo, Kim and Park 2007; Lee and Masulis 2009),

initial public offerings of equity securities (Teoh et al. 1998; Toeh and Wong 2002), share buybacks (Gong, Louis and Sun 2008), management buyouts (Wu 1997; Hafzalla 2009), the exercise of executive stock options (Bergstresser and Phillpon 2006), among others.

Earnings management typically involves the inflation of book income and results in book-tax differences. Joos et al. (2000) find evidence that the correlation between earnings and stock return weakens when book-tax differences are large; they argue that investors consider large book-tax differences indicative of opportunistic firm behavior and respond less to earnings. Phillips et al. (2003) argue that, because tax laws permit less discretion than GAAP in accounting choices, large positive book-tax differences are indicative of earnings management. They find evidence that deferred tax expense is useful in detecting earnings management. Lev and Nissim (2004) find that book-tax differences predict subsequent earnings growth. Palepu et al. (2005) suggest that an abnormal book-tax difference indicates worsening earnings quality. In sum, accounting earnings are of lower quality when book-tax differences are large.

Researchers in general look for the presence of earnings management by studying earnings quality of the firm. A number of researchers have focused on the association between earnings and stock returns in evaluating earnings quality (Francis and Schipper, 1999; Ecker et al., 2006, Wang 2006). This approach extracts information about earnings from stock prices by assuming the market is efficient. However, for directly measuring earnings management, the general approach is based on deducing earnings quality from accounting information. The measures based on this approach are typically related to the level of accruals (Sloan, 1996); the estimation error in accruals (Dechow and Dichev, 2002); and accruals volatility (Francis et al., 2005). Despite accruals are predominantly used in studies of earnings management, conflicting empirical results have been reported in the literature (Dechow et al. 2010). Thus, some have argued that book-tax differences may serve as an indicator of earnings management given the documented correlation between book-tax differences and earnings quality (Lev and Nissim 2004; Hanlon 2005; Palepu et al. 2005; Ayers 2009). To infer earnings management from book-tax differences, Lev and Nissim (2004) study the disparity

between temporary and permanent differences whereas Schallheim and Wells (2007) compare current tax spread and total tax spread. Ayers et al. (2007) investigate the difference between high tax-planning and low tax-planning firms whereas Poterba et al. (2008) analyze tax footnote disclosures.

Despite the frequently alleged relation between book-tax differences and earnings management, few attempts have been made to develop a measure of earnings management based on the characteristics of book-tax differences. To fill this void, I develop a simple model that measures earnings management directly from book-tax differences.

2.3 SAMPLE SELECTION

The sample period used in my study is between 1999 and 2010. My initial sample begins with Compustat firms that have a book value of assets over 100 million dollars. In addition to excluding American Depository Receipts, regulated firms with SICs between 4900 and 4999 and financial firms with SICs between 6000 and 6999 are also excluded. This initial sample consists of more than 5,196 US firms and 62,341 firm years. Based on the availability of executive stock option data and information on firm credit ratings, I eliminate firm-year observations that do not have the information needed for my analysis. The final sample has 5,014 firm-year observations from 2005 to 2010 for my investigation of executive stock option exercises; 4,866 firm-year observations from 2005 to 2010 for the re-examination of firm credit ratings, and 3,486 firm-year observations from 2005 to 2010 for the re-examination of the impact of earnings management on firm value.

****Insert Tables 1a, 1b, 2a, 2b, 3a, 3b and 3c about here****

Table 1a provides a list of the 20 firms with the highest book-tax income differences over the 1999 to 2010 time period. The 20 firms are large reputable firms in the market. The size of the average book-tax difference is quite significant. For example, General Motors have an average book-tax difference of more than $1.9 billion dollars and International Business Machines (IBM) has an average of about $1.6 billion. Entergy Corporation has an average book-tax difference of about $350

million, which is the smallest amount the 20 firms. The considerable size of book-tax differences, as shown in the table, suggests the importance of understanding their underlying information contents. Table 1b shows the top 20 firms with the largest standard deviation of book-tax income differences per year over the 1999 and 2010 period. Table 2 reports the sample selection criteria and descriptive statistics of key variables of the sample. Table 3 reports correlation coefficients among the key variables.

2.4 METHODOLOGY

2.4.1. Measuring Book – Tax differences

Following Manzon and Plesko (2002), I use total book–tax differences instead of current book–tax differences to study earning management. Total book tax difference is defined as the difference between a firm's income for financial reporting purposes and the firm's taxable income:

Total Tax book difference = Total book income – Taxable income

Where:

Total book income = pre-tax book income (Compustat item # 170) - minority interest (Compustat item # 49)

$$\textbf{Taxable income} = \frac{[\textbf{Federal tax expense (data 63)} + \textbf{foreign tax expense (data 64)}]}{\textbf{U.S. statutory tax}} \mid d\textbf{NOLA}$$

- dNOLA is change in net operating loss carryforward, (Compustat item # 52).
- If federal or foreign tax expense is missing:

  Tax expense = Total income tax expense (Compustat item # 16) - deferred income tax expense (Compustat item # 50).

Manzo and Plesko (2002); Schallheima and Wells (2006) identify four groups of factors that are likely to have a significant impact on the size of book-tax

differences. These factors are to be used as control variables in my estimation models in this study. The factors include:

1. Tax favored investing activity
    a. Profitability: Profitable firms can make efficient use of tax deductions and tax credits and benefit from tax exemptions. As a result we can expect a positive relation between profitability and book-tax differences. In this study, pre-tax income to total assets is used as a proxy for profitability.
    b. Change in net sales: This is a key variable in the Manzon and Plesko (2002) model. Manzon and Plesko use the variable to proxy for firm growth. They find a positive relation between firm growth and book-tax differences. Growing firms may make more significant investments in tax-favored assets that generate timing differences in the recognition of expenses for financial reporting and tax purposes.
2. Timing differences

Differences between financial reporting and tax regulations in the timing of recognizing incomes and expenses give rise to book-tax gaps. One of the major variables related to timing differences is Property, Plant, and Equipment (PP&E here after). The depreciable lives of PP&E are set by statute for tax purposes, but firms have discretion in choosing depreciation methods when computing book income. Thus, Manzon and Plesko (2002) expect the book-tax difference to increase with utilization of depreciable assets. They also expect the size of book-tax gap to increase with the amount of younger assets (measured as the ratio of net PP&E to gross property, plant, and equipment to total assets). Another item associated with timing differences is postretirement benefits accounts as these accounts frequently hold tax-deferred assets.

3. Permanent differences.

Permanent book-tax differences arise when revenue or expense is recognized under one system but not the other. Unlike deferred taxes, these permanent differences do not reverse. Permanent differences also arise in a year when items of income or loss by-pass the income statement. An example is the exercise of employee stock options. Employees tend to exercise stock options when

corporate taxable income is high, shifting corporate tax deductions to the years with higher tax rates. These direct tax benefits of options increase in the convexity of the tax function). Other examples of permanent differences include Capital Lease Obligation and Current Operating Lease Expense.

4. Noise factors.

Foreign Operations: if firms operate in foreign countries that have a lower tax rate on corporate income than United States, they have incentives to shift taxable earnings to those foreign countries.

Size: Large firms may be able to more efficiently devise and execute investing plans to exploit tax-advantaged assets.

2.4.2. Measuring Earnings Management from book-tax differences

Book-tax differences arise when a firm manages its book income and/or pursues tax avoidance activity. So far there have been very few attempts to measure earnings management directly from book-tax differences. A major challenge is that tax returns are not reported to the public, making information pertinent to book-tax differences not observable to most researchers and investors. In addition, it is difficult to isolate the effect of book income earnings management when book–tax differences are likely related to both tax planning activity and accruals management. Desai and Dharmapala (2006) use simple regressions regressing book-tax differences on total accruals to quantify the degree to which earnings management is responsible for the gap between book income and taxable income; the authors consider the regression residual a measure of tax avoidance.

My estimation of earnings management from box-tax differences is based on the premise that earnings management is more than just accruals management. Dechow et al. (2010) point out that conflicting results are found in the literature when earnings management is measured by changes in accruals. There is ample evidence in the literature that earnings management could be related to taxable income. For example, Dhaliwal, Gleason, and Mills (2004) and Cook, Huston and Omer (2008) find evidence that firms manage earnings by manipulating effective tax rates. Phillips, Pincus and Rego 2003) find deferred tax expenses provide useful

information beyond accruals in detecting earnings management. Erickson, Hanlon and Maydew (2004) document that some firms overstate financial accounting income on their tax returns even though they have to pay a penalty. Based on these findings, I therefore develop a comprehensive measure of earnings management that reflects both accruals management in financial reporting and taxable income related earnings manipulations. I call this comprehensive measure book-tax difference total earnings management (BTDTEM). I argue that BTDTEM is more powerful than conventional earnings management measures that focus on accruals management only. Specifically, BTDTEM can detect tax-related earning management even when there is insignificant book income accruals management. My procedure encompasses two stages. First, I decompose book-tax differences into explained and unexplained components. I use conventional factors discussed in the literature to explain fluctuations in book-tax differences. This first step allows me to quantify the extent to which book-tax differences can be explained by structural factors. Second, I interpret the unexplained residual as total earnings management attributable to other factors such as accruals management and tax sheltering activity (Manzo and Plesko 2002). Then I calculate the standard deviation of a firm's unexplained residuals across a five-year period, i.e., $\varepsilon_{i;t}$ through $\varepsilon_{i;t-4}$ and call the standard deviation of the residuals book-tax difference total earnings management (BTDTEM). The focus on the standard deviation of regression residuals is based on the argument that the level of unexplained residuals is not indicative of a firm's earning management because the residuals could remain consistently high or low for an extended period due to nondiscretionary factors, but the associated small or large standard deviation could inform us of a higher or lower earnings quality (Francis et al. 2005). In addition, Graham and Tucker (2006) and Wilson (2009) report that many tax shelters generate permanent book-tax differences, thus the standard deviation of unexplainable residuals in my estimation model is more likely related to temporary tax sheltering activity which is a more realistic indicator of tax-related earnings management. The standard deviation of unexplained residuals therefore provides a good measure reflecting discretionary total earnings management that fluctuates from time to time.

I follow Manzo and Plesko (2002 and Schallheima and Wells (2006) in selecting the explanatory variables of book-tax differences (see appendix for variable descriptions):

$$\text{Book-tax differences}_{i,t} = \alpha_{i,t} + \beta_1 dSALE + \beta_2 dPRBA + \beta_3 dGDWL + \beta_4 PPENT/PPEGT + \beta_5 PPEGT + \beta_6 PIFO + \beta_7 DCLO + \beta_8 NonGDWLINTAN + \varepsilon_{i,t} \quad (1)$$

where dSale is change in net sales, PPNET/PPEGT is net Plant, Property and Equipment to gross Plant, Property and Equipment, dPRBA is change in post-retirement benefits funded, PIFO is foreign pretax income, DCLO is capitalized lease obligations, dGDWL is change in goodwill, and NonGDWLINTA is non-goodwill tangible assets. The standard deviation of the residuals, measuring book-tax total earnings management (BTDTEM), is used as an independent variable in the issues that I re-examine in this study.

To confirm the adequacy of the book-tax total earnings management, I also estimate a conventional earnings management measure based on the accruals quality model of Francis et al. 2005 and use it as a benchmark to check my results. Accruals are estimated by the following firm-level time-series regression model as suggested by Dechow and Dichev (2002) and McNichols (2002):

$$dWC_{i,t} = c + \phi_1 CFO_{i,t-1} + \phi_2 CFO_{i,t} + \phi_3 CFO_{i,t+1} + \phi_4 \Delta Sale_{i,t} + \phi_5 PPE_{i,t} + \mu_{i,t} \quad (2)$$

where dWC is defined as the change in working capital and is calculated as changes in account receivable plus changes in Inventory plus changes in tax payable and plus changes in other assets (Compustat item #302 +Compustat item #303+ Compustat item #304 +Compustat item #305 + Compustat item #307). CFO is cash flow from operations from the SFAS No. 95, Statement of Cash Flows, (Compustat item #308); and $\Delta Sale_{i,t}$ are the change in sales in year t (Compustat item #12) and $PPE_{i,t}$ are the level of property, plant, and equipment of firm i in year t (Compustat item #7), in Compustat. In the model, the error term is a measure of earnings quality. Accruals quality is the standard deviation of the error term over a rolling 5-year window.

Insert Table 2.4 about here

Table 4 reports the estimation of my measure of book-tax total earnings management (BTDTEM) as well as that of a conventional accruals measure (accruals quality of Francis et al. 2005) for comparison purpose. My estimation model (the book-tax total earnings management model) is reported as Model 1 in Table 4 whereas the accruals model is Model 2 in the table. Consistent with existing literature, all the coefficients of the structural factors in model 1 are significant. Similarly in all the variables are also significant in Model 2. The results show that the two models have good explanatory power. For each firm-year, I calculate the standard deviation of the residuals from year t-4 to year t in each model to estimate the respective earnings management measure. Each earnings management measure is then used as an independent variable in my re-investigation of insiders' stock option exercises; firm credit rating; and investors' reactions and firm value.

Taxable income could be a source of information on firm performance if the firm has poor earnings quality (Ayers et al. 2009). As a result, I also sort the sample by the degree of tax planning into high tax-planning and low tax-planning firms when performing my analysis. Following Dyreng et al. (2008) I identify high tax planning firms as firms having accumulated effective tax rates (*ETR*) below the median of each year and low tax planning firms as firms having accumulated effective tax rates (*ETR*) above the median. The accumulated effective tax rates (*ETR*) is calculated as follows:

$$ETR_{i,t} = \frac{\Sigma_{m=t-4}^{t-1}(CTE)_{im}}{\Sigma_{m=t-4}^{t-1}(PI_{im} - Special\ Items_{im})}$$

The numerator, *CTE*, is current tax expense calculated as total tax expense (Compustat item #16) less deferred tax expense (Compustat item #50) summed over the five-year period from *t-5* through *t-1*. The denominator is the difference between *PI*, pre-tax income, and *Special Items* accumulated over the five-year period from *t-5* through *t*. If *Special Items* is missing, it is set equal to zero.

2.4.3 The three revisited earnings management related issues

a) Earnings Management and Executive stock option exercises

The existing literature has provided evidence that corporate insiders manipulate earnings accruals to obtain a better exercise price for their stock options. Baker (2008) reports that insiders manage earnings to lower the share price on the option grant date so that a lower exercise price could be selected. Aboody and Kasznik (2000) find that bad news tends to precede grant dates and good news tends to follow. Heron and Lie (2006) document that managers have the ability to manipulate the grant date around known share price history. However, there is conflicting evidence regarding the relation between earnings management and executive stock option exercises. For example, Bartov and Mohanram (2004) and Bergstresser and Philippon (2006) find evidence that managers influence share price movements and time their stock option exercises accordingly. In sharp contrast, Carpenter and Remmers (2001) find no evidence that insiders use private information to time option exercises. Aboody, Hughes, Liu and Su (2008) also report only weak evidence that option exercises precede bad news. Armstrong, Jagolinzer, and Larcker (2010) find that accounting irregularities occur less frequently at firms where CEOs have higher levels of stock and option based compensation. In addition, Armstrong et al. (2010) also find conflicting results among ten recent studies on the relation between accounting manipulation and executive stock option holdings.

Given the conflicting evidence on executive stock option exercises reported in existing literature when earnings management is measured by accruals, I re-examine the relation between earnings management and executive stock option exercises using the book-tax total earnings management measure developed in this study. Since earnings management can be achieved through tax avoidance (Dhaliwal, Gleason, and Mills 2004; Cook, Huston and Omer 2008), I posit that the book-tax total earnings management measure I developed from book-tax differences could be more powerful in detecting correlations between earnings management and executive stock option exercises. Specifically, the total book-tax earnings management measure can detect the influence the taxable income related earnings management may have on executive stock option exercises even when there is no book income earnings management.

For my investigation, I develop the following model based on that of Mc Cannally (2006):

$$OPTEXD_{i,t} = c + \beta_1 BTDTEM_{i,t} + \beta_2 HighTaxPlanning*BTDTEM_{i,t} + \beta_3 LowTaxPlanning*BTDTEM_{i,t} + \beta_4 Optgr_{i,t} + \beta_4 EPS_{i,t-1} + \beta_5 ROA_{,t} + \beta_6 DV_{i,t} + \beta_7 CAPX_{i,t} + \beta_8 LSIZE_{i,t} + \beta_9 PTB_{i,t} + \beta_{10} HighTaxPlanning_{i,t} + \beta_{11} Industry\ Dummies + \beta_{12} Year\ Dummies + \epsilon_{i,t} \quad (3a)$$

$$OPTEXD_{i,t} = c + \beta_1 AbnormalAccruals_{i,t} + \beta_2 Optgr_{i,t} + \beta_4 EPS_{i,t-1} + \beta_5 ROA_{,t} + \beta_6 DV_{i,t} + \beta_7 CAPX_{i,t} + \beta_8 LSIZE_{i,t} + \beta_9 PTB_{i,t} + \beta_{11} Industry\ Dummies + \beta_{12} Year\ Dummies + \epsilon_{i,t} \quad (3b)$$

where $OPTEXD_{i,t}$ represents Insiders' option exercises. BTDTEM is the standard deviation of abnormal book-tax income differences obtained from equation (1) and $AbnormalAccrual_{i,t}$ is the standard deviation of earning accruals obtained from equation (2). Following Mc Cannally, option grants (OPTGR) is added as a second incentive variable to allow for the situation that insiders may face multiple option related incentives. Factors including profitability, leverage, dividends, market-to-book ratio, firm size and Z-Score are also controlled for because of the possible effect they may have on firm price and option compensation. Net operating loss to assets and surplus cash are suggested by Coles et al (2006). To capture earnings management, equation 3a uses book-tax total earnings management measure (BTDTEM) whereas equation 3b uses the conventional accruals earnings management measure.

b) Book-tax differences, earnings management and firm credit ratings

Credit rating agencies serve the dual functions of monitoring firm behavior and disseminating information in capital markets. Despite some researchers have voiced concerns about the quality of credit rating agencies' products because of the profit-making motives of rating agencies and the limited competition in the rating industry (Admati and Pfleiderer 1986; Lizzeri 1999; Hunt 2009 'Columbia Business

law Review'), other researchers find evidence that credit ratings provide effective monitoring functions over firm behavior (Bannier, Hirsch, and Wiemann 2012).

It has been reported in the literature that book-tax differences provide significant information of corporate earnings quality to credit analysts (Lev and Nissim 2004; Hanlon 2005). I revisit this topic because I argue that the determination of the firm's credit rating is complicated by the information contained in book-tax differences. As shown by Ayers et al. (2009), taxable income has low information content for high tax-planning firms because tax planning obscures the actual firm performance. However, Ayers et al. also find that the taxable income of high tax-planning firms is more informative if the firms are associated with poor earnings quality. For example, tax planning activity that results in increases in deferred tax liability might be an indication of deteriorating earnings quality. Based on the above, I hypothesize that credit analysts are likely to look for additional information contained in the book-tax differences of high (low) tax-planning firms. I posit that credit analysts are likely to react favorably to the tax savings associated with tax planning activity once the total information contained in book-tax differences is deciphered. I also predict that low tax-planning firms that have poor earnings quality are unlikely to provide extra information to credit analysts through the book-tax difference. In short, I opine that analysts react differently to tax sheltering and accruals management information between high and low tax-planning firms. To test whether creditor analysts are able to see through the information of book-tax differences, I use the following ordered probit regression models:

$$Pr.(Credit\ ratings_{i,t}) = c + \beta_1 BTDTEM_{i,t} + \beta_2 \text{HighTaxPlanning*BTDTEM} + \beta_3 \text{LowTaxPlanning*BTDTEM} + \beta_4 LOSS_{i,t} + \beta_5 dCFO_{i,t} + \beta_6 Std.(ROA_{t,t-4})_{i,t} + \beta_7 INTCOV_{i,t} + \beta_8 BookLeverage_{i,t} + \beta_9 DSale_{i,t} + \beta_{10} SCash_{i,t} + \beta_{11} MTB_{i,t} + \beta_{12} \text{HighTaxPlanning} + \beta_{13} Year\ fixed\ effects + \beta_{14} Industry_{i,t} + \eta_{i,t} \quad (4a)$$

$$Pr.(Credit\ ratings_{i,t}) = c + \beta_1 AbnormalAccruals_{i,t} + \beta_2 LOSS_{i,t} + \beta_3 dCFO_{i,t} + \beta_4 Std.(ROA_{t,t-4})_{i,t} + \beta_5 INTCOV_{i,t} + \beta_6 BookLeverage_{i,t} + \beta_7 dSale_{i,t} + \beta_8 SCash_{i,t} + \beta_9 Year\ fixed\ effects + \beta_{10} Industry_{i,t} + \eta_{i,t} \quad (4b)$$

Where:

Credit ratings$_{i,t}$ is S&P Domestic Long Term Issuer Credit Rating obtained from Compustat. BTDTEM is book-tax total earnings management obtained from equation (1) an AbnormalAccrual$_{i,t}$ is the standard deviation of earning accruals obtained from equation (2). HighTaxPlanning*BTDTEM$_{i,t}$ is an interaction variable that captures the combined effect of a high tax planning and high fluctuation in abnormal book tax differences. LOSS is a (01) dummy variable that has a value of 1 if the firm operating EPS is negative and 0 otherwise. A negative sign is expected because a lower profit should have negative effects on a firm's creditworthiness. dCFO is the change in a firm's operating cash flow from year *t-1* to year *t*. A positive sign is expected. STDROA is standard deviation of ROA from year t-1 to year t which is calculated using five years data from year t-4 to t. BLEV is book leverage measured as the ratio of total debt to total assets. A positive sign is expected. INTCOV is interest coverage calculated as EBITDA divided by interest. A positive sign is expected.

c) Book-tax differences, earnings management and firm values

Prior research concludes that investors do not fully comprehend the implication of accruals management (Richardson et al. 2005; Hanlon 2005). Sloan (1996) find that investors do not respond instantaneously to the information of earnings accruals Therefore, firms can influence share price movements by managing earnings accruals. I argue that share price movements can also be influenced by tax-related earnings management based on the evidence reported by Heflin and Kross (2005) that book-tax differences are capable of explaining contemporaneous annual stock returns. I further argue that since the source of book-tax differences is highly complicated, it is difficult for most investors to see through all the information contained. Thus, I posit that investors are likely to have overoptimistic reactions to contemporaneous tax sheltering activity but would correct their overreactions in the following years once the earnings quality is found questionable. Therefore, I predict that book-tax total earnings management is positively associated with firm value in the current year but negatively associated with firm value in the subsequent year.

To test my hypothesis, the following time series cross-sectional regression model is used.

$$Firm\ Value_{i,t} = c + \beta_1 BTDTEM_{i,t} + \beta_2 BTDTEM_{i,t-1} + \beta_3 BTDTEM_{i,t-2} + \beta_4 BTDTEM_{i,t-3} + \beta_5 Size_{i,t} + \beta_6 ROA_{i,t} + \beta_7 dSALE_{i,t} + \beta_8 DividendCut_{i,t} + \beta_9 BLEV_{i,t} + \beta_{10} MLEV_{i,t} + \beta_{11} CAPEX_{i,t} + \beta_{12} Zscore_{i,t} + \beta_{13} NOLA_{i,t} + \beta_{14} CashSurplus_{i,t} + \beta_{15} CashToAssets_{i,t} + \beta_{16} HighTaxPlanning_{i,t} + \beta_{17} Year\ fixed\ effects + \beta_{18} Industry + \eta_{i,t} \quad (5a)$$

$$Firm\ Value_{i,t} = c + \beta_1 AbnormalAccruals_{i,t} + \beta_2 Size_{i,t} + \beta_3 ROA_{i,t} + \beta_4 dSALE_{i,t} + \beta_5 DividendCut_{i,t} + \beta_6 BLEV_{i,t} + \beta_7 MLEV_{i,t} + \beta_8 CAPEX_{i,t} + \beta_9 Zscore_{i,t} + \beta_{10} NOLA_{i,t} + \beta_{11} CashSurplus_{i,t} + \beta_{12} CashToAssets_{i,t} + \beta_{13} Year\ fixed\ effects + \beta_{14} Industry + \eta_{i,t} \quad (5b)$$

where Firm Value $_{i,t}$ is change in market to book ratio from year *t-1* to year *t* and is calculated as market value of total assets divided by book value of assets. $BTDTEM_{i,t}$ and its lags of one, two and three years are the standard deviation of the abnormal book-tax income differences in years t, t-1, t-2 and t-3, respectively. $AbnormalAccruals_{i,t}$ and its lags are the standard deviation of accruals quality in years t, t-1, t-2 and t-3, respectively. Based on the studies of Graham et al. (2005) and Coles et al. (2006), the control variables include firm size, profitability, sales, dividends, leverage, and capital expenditure. Firm size is the natural log of the book value of assets. A positive sign is expected. ROA is used to capture the firm's profitability. A positive sign is expected. dSALE is an one year grow in sale calculated as the natural logarithm of net sale from year t-1 to year t. Dividend is an indicator variable that takes the value of one if there is a reduction in annual dividend, and zero otherwise. A negative sign is expected. BLEV is book leverage. A positive sign is expected. MLEV is market leverage computed as the ratio of debt to market value of total assets. A negative sign is expected. CAPEX is net capital expenditure normalized by total assets, capturing growth opportunities. A positive sign is expected.

2.5 EMPIRICAL RESULTS

2.5.1. Book-tax total earnings management and Executive stock option exercises

In table 2.5, I report the result of the re-examination of the relation between executive stock option exercises and earnings management. The estimation results of equations 3a and 3b are presented. My focus in table 2.5 is to see if the book-tax total earnings management measure (BTDTEM) or the conventional accruals management measure has a higher explanatory power of executive stock option exercises. A priori, I posit that BTDTEM is more accurate and powerful in predicting executive option exercises because of the additional information captured by taxable-income related earnings management. From the pooled OLS regression result of model 1, the coefficient on BTDTEM is positive and significant at the 10% level. Despite the level of significance is only moderate, the positive sign is expected. It confirms that there are higher levels of executive stock option exercises when earnings management is elevated. The result is consistent with the findings of Bartov and Mohanram (2004) and Bergstresser and Philippon (2006). A plausible explanation is that insiders do not rush to exercise their options quickly as it has been found by many researchers that investors do not fully comprehend instantaneously the implication of earnings management and that they frequently fail to react correctly (Sloan 1996; Hanlon 2005; Richardson et al. 2005). Thus insiders might be able to exercise their options immediately or wait a while to exercise following earnings management. The coefficients on the control variables are mostly significant and have the expected sign, with the exception of OPEPS. In the pooled OLS regression of model 2, I investigate the interaction between tax planning and book-tax total earnings management. The interaction variable HighTaxPlanning*BTDTEM indicates that the book-tax total earnings management (BTDTEM) is associated with higher levels of taxable income related earnings management. The interaction variable LowTaxPlanning*BTDTEM indicates that BTDTEM has lower levels of taxable-income related earnings management as the firm is a low tax-planner. As expected, the coefficient on HighTaxPlanning*BTDTEM is positive and significant at the 1% level, indicating that executives exercise their

options upon managing book income and/or taxable income. The coefficient on LowTaxPlanning*BTDTEM is also positive and significant at the 1% level, suggesting that executives exercise their options upon managing book income and taxable income even though the amount of taxable income related earnings management might be relatively smaller. In short, executives exercise their options following earnings management regardless of the source of earnings management. The fixed effect model results of model 1 and model 2 are similar to the pooled OLS results.

The result of the accruals model is presented in the last two columns of table 2.5. In the pooled OLS model, it is shown that the coefficient on abnormal accruals is positive and significant at the 1% level. However, the coefficient on abnormal accruals is insignificant in the fixed effect model. Moreover, results using accruals quality as the measure of earnings management in Table 2.5a show a negative coefficient that is significant at 1 percent. The negative coefficient is unexpected and contradictory to existing results in the literature. This inconsistency, however, confirms that survey result of Dechow et al. (2010) that earnings management measured by accruals could lead to inconsistent findings. The conflicting results of accruals in explaining executive stock options exercises confirms the importance of considering taxable income related earnings management in examining a firm's manipulation of earnings.

****Insert Tables 2.5 and 2.5a about here****

2.5.2. Book-tax total earnings management and firm credit ratings

Table 2.6 presents the result of estimation equations (4a) and (4b). Ordered Probit regressions are performed to investigate the relation between earnings management and firm credit ratings. In model 1 of the book-tax earnings management model, the regression coefficient on BTDTEM is negative and significant at the 1% level. The result is consistent with the finding in existing literature that firm credit ratings are revised downward when there is evidence of earnings management (poor earnings quality). The coefficient on LOSS is negative and significant at the 5% level, indicating that loss firms are more likely

associated with downgrades of credit ratings. The coefficient on STDROA is also negative and significant, confirming existing literature that volatile firm performance is associated with poorer credit ratings. Also consistent with existing literature, the coefficients of CFO, INTCOV, DSALE, SCASH_AT, and MTB are positive and significant at the 1% level. In model 2 of the book-tax earnings management model, the interaction variable HightaxPlanning*BTDTEM reflects the scenario in which the firm is a high-tax-planning firm that is associated with poor earnings quality. Seida (2003) and Ayers et al. (2009) show evidence that taxable income is informative for firms that have poor earnings quality. That is, outsiders look to taxable income for information when firm performance is masked by earnings management. In Table 2.6, the coefficient on HightaxPlanning*BTDTEM is positive and significant at the 1% level. The result is consistent with the implication that credit analysts look past earnings management and give favorable credit ratings reviews if there were savings associated with tax planning activity. Thus, BTDTEM provides more information for credit analysts when the measure reflects the activity of high-tax planning firms. The coefficient on LowTaxPlanning*BTDTEM is insignificant. The result implies that credit analysts could not glean useful information when firms with poor earnings quality do not pursue tax planning activity. The result is consistent with the findings of Seida (2003) and Ayers et al. (2009). In short, BTDTEM has good explanatory power of firm credit ratings once analysts take into consideration the information provided by tax planning activity. In the last column in table 2.6, the result of the abnormal accruals model is presented. The coefficient on abnormal accruals is negative and significant at the 1% level. The result is consistent with existing findings that earnings management is associated with lower firm credit ratings. Similar result is obtained in Table 2.6a where accruals quality is used instead of abnormal accruals. Comparing the results of the book-tax model and the accruals model, it can be summarized that BTDTEM provides extra information as taxable income related information is captured by the measure.

****Inserts Tables 2.6 and 2.6a here****

2.5.3. Book-tax total earnings management and firm value

In Table 2.7, I present the result on the relation between earnings management and firm value. In this table, I compare the coefficients of BTDTEM and accruals to assess how investors react to information on earnings management. There is evidence in existing literature that firms can manipulate share price as investors fail to respond instantaneously without errors to managed earnings. Thus, a priori, there should be no difference in how investors react to BTDTEM and accruals because the underlying message conveyed by the two measures is that earnings are manipulated. However, it is likely that investors react more strongly (overoptimistically) to BTDTEM because of the additional information of taxable income related earnings management. Thus, if investors react as normally documented in the literature, I expect the coefficients of both BTDTEM and Accruals to be positive and that the coefficient on BTDTEM to be more significant than that of accruals. The result of the book-tax total earnings management model confirms my expectation. In the pooled OLS regression, the coefficient on BTDTEM is positive and significant at the 10% level in the pooled OLS regression. In the fixed effect model, the coefficient on BTDTEM is positive and significant at the 1% level. The result is consistent with existing literature that investors respond incorrectly because they fail to understand immediately the meaning of earnings management. The coefficients on lag1(BTDTEM) in the pooled OLS regression is negative and significant at the 10% level, implying that investors correct their mistakes in the following time period as they gradually decipher the information content of earnings management. For the fixed effect model, a similar result is observed as the coefficients of lag1(BTDTEM) and lag2(BTDTEM) are negative and significant. Over all, the book-tax total earnings management model produces results that are expected and consistent with the findings in existing literature. On the other hand, the coefficient on abnormal accruals is significant at the 10% percent in the pooled OLS model but insignificant in the fixed effect model, confirming that abnormal accruals are less useful in explaining firm value. It is surprising to see a negative and significant coefficient on accruals quality in Table 2.7a in the pooled OLS and fixed effect regressions. The finding is surprising because it suggests investors are able to understand immediately the meaning of earnings management and react negatively. The inconsistent results based on abnormal accruals and accruals

quality reinforce the observation of Dechow et al. (2010) that using accruals as a measure of earnings management may lead to conflicting results. In short, the result in Tables 2.7 and 2.7a confirm that BTDTEM is a reliable measure of earnings management as it provides results that are significant and consistent with the literature.

****Insert Tables 2.7 and 2.7a here****

2.6 CONCLUSION

In the present study a new measure of earnings management is developed from book-tax differences. The new measure is a comprehensive measure that encompasses taxable income related earnings management as well as conventional book income related accruals management. Using the new measure I find that executives time their stock option exercises regardless of the source of earnings management; credit rating agencies glean additional information from book-tax differences than the conventional earnings management measures that focus specifically on accruals; and investors respond to the earnings management information contained in the new measure as expected in the literature. This study shows that the new measure of earnings management provides empirical evidence that opportunistic managers use tax planning activity to advance personal interests. Some of my results have not been documented in literature. My study contributes to the literature on earnings management by providing a new approach to detect earnings management and it is applicable to explain and predict many issues in finance.

BIBLOGRAPHY

Atwood, T.J., Drake, Michael S., Myers, Linda A., 2010: Book-tax conformity, earnings persistence and the association between earnings and future cash flows, Journal of Accounting and Economics, Volume 50, Issue 1, May 2010, Pages 111–125.

Ayers, B., Jiang, J., Yeung, P., 2006. Discretionary accruals and earnings management: An analysis of pseudo earnings targets. The Accounting Review 81, 617-652.

Ayers, B., Jiang, J., Laplante, S., 2009, "Taxable Income as a Performance Measure: The Effects of Tax Planning and Earnings Quality", Contemporary Accounting Research, Vol. 26 No. 1, pp. 15–54

Bartov, E., Mohanram, P., 2004, "Private Information, Earnings Managements, and Executive Stock-Option Exercises", The Accounting Review, Vol. 79, No. 4 2004 pp. 889-920.

Bergstresser, D. 2006. Discussion of "Overinvestment of free cash flow". Review of Accounting Studies 11(2-3): 191-202.

Burns, N., Kedia, S., 2006. "The impact of performance-based compensation on misreporting", Journal of Financial Economics 79, 35–67

DeAngelo, Harry, and Ronald W. Masulis. "Optimal Capital Structure under Corporate and Personal Taxation." Journal of Financial Economics 8 No. 1 (March, 1980): 3– 29.

Desai, M., Hines, J., 2002. Expectations and expatriations: tracing the causes and consequences of corporate inversions. National Tax Journal 55, 409–440..

Desai, Mihir A., and Dhammika Dharmapala. "Corporate Tax Avoidance and High Powered Incentives." Journal of Financial Economics 79 No. 1 (January, 2006): 145–79.

Desai, Mihir A., and Dhammika Dharmapala, "Earnings Management, Corporate Tax Shelters, and Book–Tax Alignment", National Tax Journal, Vol. XII, No. 1, March 2009.

Dechow, P., 1994. Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals. Journal of Accounting and Economics 18, 3-42.

Dechow, P., Sloan, R., Sweeney, A., 1995. Detecting earnings management. The Accounting Review 70, 193-225.

Dechow, P., Sloan, R., Sweeney, A., 1996. Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC. Contemporary Accounting Research 13, 1-36.

Dechow, P.M., Dichev, I.D., 2002. The quality of accruals and earnings: the role of accrual estimation errors. Accounting Review 77, 35–59.

Dechow, P., Ge, W., 2006. The persistence of earnings and cash flows and the role of special items: Implications for the accrual anomaly. Review of Accounting Studies 11, 253-296.

Dechow, P., Ge, W., and Schrand, C., 2010: Understanding earnings quality: A review of the proxies, their determinants and their consequences, Journal of Accounting and Economics, Volume 50, Issues 2–3, December 2010, Pages 344–401.

Dichev, I.D., Skinner, D.J., 2002. Large scale evidence on the debt covenant hypothesis. Journal of Accounting Research 40, 1091–1123.

Dichev, I., Tang, V., 2008. Matching and the changing properties of accounting earnings over the last 40 years. The Accounting Review 83, 1425-1460.

Ecker, F., Francis, J., Kim, I., Olsson, P., Schipper, K., 2006. A returns-based representation of earnings quality. The Accounting Review 81, 749-780.

Efendi, J., Srivastava, A., Swanson, E., 2007, "Why do corporate managers misstate financial statements? The role of option compensation and other factors", Journal of Financial Economics 85, 667–708.

Erickson, M., Wang, S., 1999. Earnings management by acquiring firms in stock for stock mergers. Journal of Accounting and Economics 27, 149-176.

Erickson, Merle, Michelle Hanlon, and Edward L. Maydew, 2004. "How Much Will Firms Pay for Earnings That Do Not Exist? Evidence of Taxes Paid on Allegedly Fraudulent Earnings." *Accounting Review* 79 (April, 2004): 387- 408.

Erickson, J. Seida, and S. Wang. 2003. An evaluation of book/ tax differences: Enron's tax disclosures. In *Cases in Tax Strategy, Third Edition*, edited by M. Erickson. Boston, MA: Pearson Custom Publishing.

Francis, J., Schipper, K., 1999. Have financial statements lost their relevance?. Journal of Accounting Research 37, 319-352.

Francis, J., LaFond, R., Olsson, P., Schipper, K., 2005. The market pricing of accruals quality. Journal of Accounting and Economics 39, 295-327.

Francis, J., Olsson, P., Schipper, K., 2006, Earnings quality. Foundation and Trends in Accounting 1, 259-340.

Gong, G., Louis, H., Sun, A., 2008. Earnings management, lawsuits, and stock-for-stock acquirers' market performance. Journal of Accounting and Economics 46, 62-77.

Graham, J., Harvey, C., Rajgopal, S., 2005. The economic implications of corporate financial reporting. Journal of Accounting and Economics 40, 3-73.

Graham, John R., and Alan Tucker. 2006, "Tax Shelters and Corporate Debt Policy." Journal of Financial Economics 81 No. 3: 563–94.

Hafzalla, N. M. 2009. Managerial incentives for discretionary disclosure: Evidence from management leveraged buyouts. Review of Accounting Studies 14(4): 507-533.

Hanlon, Michelle, Stacie K. LaPlante, and Terry Shevlin. 2005, "Evidence on the Information Loss of Conforming Book Income and Taxable Income." The Journal of Law and Economics 48 No. 2, 407–42.

Hanlon, M., 2005. The persistence and pricing of earnings, accruals, and cash flows when firms have large book-tax differences. The Accounting Review 80, 137-166.

Hanlon, M. and Shevlin, T. (2005). Book-Tax Conformity for Corporate Income: An Introduction to the Issues. NBER/Tax Policy & the Economy (MIT Press) 19(1): p. 101-134.

Hanlon, M and Slemrod, J, 2008: "What Does Tax Aggressiveness Signal? Evidence from Stock Price Reactions to News about Tax Shelter Involvement." *Journal of Public Economics*.

Jensen, M., 1986, "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers", The American Economic Review, Vol. 76, No. 2, pp. 323-329.

Jensen, M., 2005, "Agency Costs of Overvalued Equity", Financial Management, Vol. 34, No. 1.

Jo, H., Kim, Y., Park, M., 2007. Underwriter choice and earnings management: Evidence from seasoned equity offerings. Review of Accounting Studies 12, 23-59.

Joos, P., J. Pratt, and D. Young. 2000. Book-tax differences and the value relevance of earnings. Working paper, Massachusetts Institute of Technology, Indiana University, and INSEAD.

Lev, B., Nissim, D., 2004, "Taxable Income, Future Earnings, and Equity Values", The Accounting Review, Vol. 79, No. 4, pp. 1039-1074

Lev, B., Ryan, S., Wu, M., 2008. Rewriting earnings history. Review of Accounting Studies 13, 1- 33.

Louis, H., Robinson, D., 2005. Do managers credibly use accruals to signal private information? Evidence from the pricing of discretionary accruals around stock splits. Journal of Accounting and Economics 39, 361-380.

Manzon, Gil B., Jr., and George A. Plesko. 2002, "The Relation Between Financial and Tax Reporting Measures of Income." Tax Law Review 55 No. 2: 175– 214.

Masulis, R., and Lee ,W., 2009, "Seasoned equity offerings: Quality of accounting information and expected flotation costs", Journal of Financial Economics 92, 443–469.

Modigliani, Franco, and Merton H. Miller. 1958, "The Cost of Capital, Corporation Finance, and the Theory of Investment." American Economic Review 48 No. 3 : 261–97.

Palepu, K., J. Healy, and V. Bernard. 2005. *Business Analysis and Valuation. Using Financial Statements*. Cincinnati, OH: South-Western College Publishing.

Phillips, J., Pincus, M., Rego, S., 2003. Earnings management: New evidence based on deferred tax expense. The Accounting Review 78, 491-521.

Poterba, James, Nirupama Rao, and Jeri Seidman. 2007, "The Significance and Composition of Deferred Tax Assets and Liabilities." NBER Working Paper No. 12923. Cambridge, MA: 186 National Bureau of Economic Research.

Richardson, S., Sloan, R., Soliman, M., Tuna, I., 2005. Accrual reliability, earnings persistence and stock prices. Journal of Accounting and Economics 39, 437-485.

Sloan, R., 1996. Do stock prices fully reflect information in accruals and cash flows about future earnings?. The Accounting Review 71, 289-315.

Teoh, S., Rao, G., Wong, T., 1998. Are accruals during initial public offerings opportunistic?. Review of Accounting Studies 3, 175-208.

Teoh, S., Welch, I., Wong, T., 1998. Earnings management and the underperformance of seasoned equity offerings. Journal of Financial Economics 50, 63-99.

Teoh, S. and Wong, T., 2002. Why new issues and high-accrual firms underperform: The role of analysts' credulity. Review of Financial Studies 15, 869–900.

Wang, D., 2006. Founding family ownership and earnings quality. Journal of Accounting Research 44, 619-656.

Whitaker, C. (2006). How to build a Bridge: Eliminating the Book-Tax Accounting GAAP. The Tax Lawyer 59: p. 981-994.

Weisbach, David A. 2002a, "Ten Truths about Tax Shelters." *Tax Law Review* 55 No. 2: 215–53.

Yermack, D., 1997. CEO stock option awards and company news announcements. The Journal of Finance 52, 449-476.

APPENDIX

Definitions and measurements of variables of interest used in this study

BTD_{it} = firm *i*'s total book-tax difference in year *t*,

Where:

- Total book-tax difference = [book income - taxable income] / average total assets (Compustat item # 6).
- Taxable income = [(federal tax expense (Compustat item # 63) + foreign tax expense (Compustat item # 64)) - the top U.S. statutory tax rate] - change in net operating loss carryforward (Compustat item # 52).

If federal or foreign tax expense is missing, then

- Tax expense = total income tax expense (Compustat item # 16) - deferred income tax expense (Compustat item # 50). Book income = pre-tax book income (Compustat item # 170) - minority interest (Compustat item # 49).

Dependent Variables

- *BTD_AT* is the Total Book-Tax difference normalized by total assets.
- *OPTEXD* = stock options that were exercised for common stock during the year (millions)
- *Zscore* = 3.3*data178/data6+1.2*(Compustat item #4–data5)/data6 + data12/data6 + 0.6*data199*data25/(Compustat item #9 + data34) + 1.4*data36/data6 (compustat)
- *INTCOV = Interest Coverage = EBITDAM / Interest*
- *SPDRC* = codes of firm *i*'s Standard & Poor's senior debt rating in year *t, varying from 2 to 27.* Standard & Poor's rates a firm's debt from AAA (indicating a strong capacity to pay interest and repay principal) to D (indicating actual default).
- *MTB* = Market value-to-Book value = (Compustat item #6–data60+data199*data25)/data6

Explanatory variables

- $BTDTEM_{i,t} = STD\ [(\varepsilon_{BTD})_{i,t} + (\varepsilon_{BTD})_{i,t-1} + (\varepsilon_{BTD})_{i,t-2} + (\varepsilon_{BTD})_{i,t-3} + (\varepsilon_{BTD})_{i,t-4}]$

- Abnormal $Accruals_{i,t}$ = STD $[(\varepsilon_{WC})_{i,t} + (\varepsilon_{WC})_{i,t-1} + (\varepsilon_{WC})_{i,t-2} + (\varepsilon_{WC})_{i,t-3} + (\varepsilon_{WC})_{i,t-4}]$

Control Variables

Policy measures

- CAPEX = Net capital expenditure to assets= (Capital Expenditure – Sale of Property, Plant and Equipment)/Assets = (Compustat item #128–data107)/data6
- Book Leverage = (Compustat item #9+data34)/data6
- Market Leverage = (Compustat item #9+data34)/(Compustat item #6–data60+data199*data25)

Firm characteristics

- ROA = Return on Assets = data13/data6
- Net PPE = Net Property, Plant, and Equipment to assets = data8/data6
- Z-Score = 3.3*data178/data6+1.2*(Compustat item #4–data5)/data6+data12/data6+0.6*data199*
- data25/(Compustat item #9+data34)+1.4*data36/data6 (compustat)
- NOLA = Net Operating Loss carry forward to Total Assets = data52 / data6
- Surplus Cash = Cash from assets-in-place to total assets = (Compustat item #308–data125+ data46) / data6
- Sales Growth = $Log(Sales_t / Sales_{t-1})$
- Dividend Cut = Indicator variable that takes the value of one if there is a reduction in annual dividend, and zero otherwise
- Cash to Assets = data1/data6
- $HighTaxPlanning_{it}$ = 1 if *ETR* is in the 3rd quintile and 0 otherwise

Definitions	Variables
Total book-tax income differences	BTD
Income Taxes - Total	TXT - A16
Deferred Taxes (Income Account)	TXDI – A50
Investment Tax Credit (Income Account)	ITCI - A51
Income Taxes Paid	TXPD - A317
Standard deviation of estimate errors of total book-tax differences	STD_BTD
Insiders' stock option exercises	OPTEXD
Interest coverage	INTCOV
Book leverage (total debt to total assets)	BLEV
Pretax Income	PI - A170
Change in sale	DSALE – A12
Property, Plans & Equipment (Gross) – Total	PPEGT – A7
Property, Plans & Equipment (Net) – Total	PPENT – A8
Postretirement - Funded Status	PRBA-A330
Tax Loss Carry Forward	TLCF-A52
Pretax Income – Foreign	PIFO – A273
Accounting Changes - Cumulative Effect	ACCHG – A183
Debt - Capitalized Lease Obligations	DCLO – A84
Operating cash flow	CFO- A308
Non goodwill intangible assets	NonGDWLINTAN

Table 2.1a. 25 US Firms with the Highest Book-Tax income differences per year over 2004 - 2010 periods (million dollars)

This table reports the firms with the *highest average* of Total Book-Tax Differences over my sample period of 2004 to 2010. This sample is ranked by Total book tax spread. Firms with non-reporting or missing variables were dropped from this sample.

	Company_Name	CUSIP	MKVALT	Total Assets	Average TBTD	Average BTDTEM
1	HEWLETT-PACKARD CO	428236103	92651.87	124,503	14,663.265	0.0695
2	GENERAL MOTORS CO	37045V100	55295.05	138,898	13,919.694	0.1562
3	GENERAL ELECTRIC CO	369604103	194155.23	751,216	12,500.571	0.0210
4	LIBERTY GLOBAL INC	530555101	8419.00	33,329	10,335.657	0.1223
5	HONEYWELL INTERNATIONAL INC	438516106	41624.28	37,834	10,272.510	0.1198
6	TYCO INTERNATIONAL LTD	H89128104	17939.15	27,128	9,506.771	0.1198
7	PEPSICO INC	713448108	103286.73	68,153	8,865.469	0.0582
8	INTL BUSINESS MACHINES CORP	459200101	180220.25	113,452	8,221.918	0.0227
9	ORACLE CORP	68389X105	173426.96	73,535	8,012.524	0.0508
10	OWENS CORNING	690742101	3865.72	7,158	7,848.429	1.1327
11	COCA-COLA CO	191216100	150744.84	72,921	7,083.510	0.0472
12	AT&T INC	00206R102	173667.74	268,488	6,857.619	0.1020
13	JDS UNIPHASE CORP	46612J507	2175.89	1,704	6,759.647	1.9900
14	DOW CHEMICAL	260543103	39848.79	69,588	6,042.122	0.0360
15	MICROSOFT CORP	594918104	199450.68	86,113	5,847.929	0.0236
16	PROCTER & GAMBLE CO	742718109	170553.13	128,172	5,843.306	0.0544
17	WAL-MART STORES INC	931142103	197142.12	180,663	5,610.551	0.0199
18	SPRINT NEXTEL CORP	852061100	12639.24	51,654	4,228.898	0.1035
19	CIT GROUP INC	125581801	9441.81	50,958	4,063.231	0.0448
20	UNITED TECHNOLOGIES CORP	913017109	72522.30	58,493	4,030.796	0.0544
21	FLEXTRONICS INTERNATIONAL	Y2573F102	5654.74	11,633	3,877.713	0.2015
22	APPLE INC	37833100	259906.49	75,183	3,805.971	0.0163
23	JOHNSON & JOHNSON	478160104	169351.30	102,908	3,252.755	0.0471
24	WASTE MANAGEMENT INC	94106L109	17514.95	21,476	3,235.204	0.0474
25	GOOGLE INC	38259P508	190843.16	57,851	3,189.293	0.0532

Table 2.1b. 25 US Firms with *the highest standard deviation* of abnormal Book-Tax income differences per year over 2004-2010 periods (million dollars)

This table reports the firms with *highest average of standard deviation* of abnormal Total Book-Tax Differences over my sample period of 2004 to 2010. Firms with non-reporting or missing variables were dropped from this sample.

	Company_Name	CUSIP	MKVALT	Total Assets	AvgTBTD	AvgBTDTEM
1	SINOVAC BIOTECH LTD	P8696W104	245.46	214.360	6.196	6.2334
2	ADVANCED CELL TECHNOLOGY INC	00752K105	299.48	19.050	-54.370	5.0165
3	BROADVISION INC	111412706	56.02	68.150	690.743	4.5947
4	ZIX CORP	98974P100	286.85	66.850	120.200	3.6126
5	EGAIN COMMUNICATIONS	28225C806	17.26	15.320	80.757	2.9046
6	EMAGIN CORP	29076N206	127.26	32.700	-11.106	2.7391
7	SUN HEALTHCARE GROUP INC	8.67E+104	316.17	1,081.760	305.619	2.0565
8	JDS UNIPHASE CORP	46612J507	2175.89	1,703.600	6,759.647	1.9900
9	SHORETEL INC	825211105	210.52	170.720	1.154	1.9311
10	QUEPASA CORP	74833W206	178.87	16.450	-8.690	1.8832
11	WAVE SYSTEMS CORP	943526301	320.59	17.080	-14.117	1.7265
12	AKAMAI TECHNOLOGIES INC	00971T101	8779.67	2,352.680	381.900	1.6865
13	ANTARES PHARMA INC	36642106	54.56	13.180	-8.943	1.3053
14	ANTARES PHARMA INC	36642106	143.07	15.140	-8.943	1.3053
15	APPLIED MICRO CIRCUITS CORP	03822W406	660.85	308.660	498.234	1.2707
16	OWENS CORNING	690742101	3865.72	7,158.000	7,848.429	1.1327
17	MERGE HEALTHCARE INC	589499102	314.25	396.390	100.911	1.1155
18	PRIMUS GUARANTY LTD	G72457107	193.44	634.860	-141.805	1.0778
19	METROPOLITAN HLTH NTWRKS INC	592142103	182.15	74.720	8.258	1.0571
20	LIGAND PHARMACEUTICAL INC	53220K504	174.02	75.560	161.735	1.0316
21	NAVIDEA BIOPHARMACEUTICALS	63937X103	177.82	10.860	-24.465	1.0242
22	CIRRUS LOGIC INC	172755100	1444.00	496.620	328.154	1.0121
23	USA MOBILITY INC	90341G103	392.13	230.660	41.324	0.9892
24	LIGHTING SCIENCE GROUP CORP	53224G301	408.18	72.490	-172.405	0.9874
25	IDENIX PHARMACEUTICALS INC	45166R204	368.38	69.880	20.817	0.9782

Table 2.2: Descriptive statistics for key variables, 2004–2010

Panel A: insiders' stock option exercises, standard deviation of abnormal book-tax differences and control variables.

Variable	N	Maximum	Minimum	Mean	Median	Std Dev
OPTEXD	5,014	309.00	0.00	1.67	0.35	6.58
BTDTEM	5,014	15.50	0.00	0.11	0.05	0.33
OPTGR	5,014	244.00	0.00	1.78	0.45	6.99
OPEPS	5,014	231.69	(246.00)	1.44	1.03	6.50
ROA	5,014	482.62	(330.44)	2.56	5.08	17.29
Dividend	5,014	12,408.00	0.00	94.07	0.00	495.22
CAPX	5,014	40,595.20	0.00	269.87	31.22	1,203.53
Total Assets	5,014	797,769.00	1.60	5,173.62	891.50	24,564.41
Price to Book	5,014	1,574.98	0.01	3.81	2.23	19.42
HighTaxPlanning	5,014	1.00	0.00	0.25	0.00	0.43

Panel B: Firm credit ratings, standard deviation of abnormal book-tax differences and control variables.

Variable	N	Maximum	Minimum	Mean	Median	Std Dev
SPDRC	4,669	23.00	2.00	12.32	12.00	3.27
BTDTEM	4,669	15.50	0.00	0.12	0.05	0.37
LOSS	4,669	1.00	0.00	0.23	0.00	0.42
CFO	4,669	48,601.00	-17,332.00	809.61	99.80	2,815.19
STDROA	4,669	616.95	0.02	8.25	3.61	20.71
INTCOV	4,669	14,777.70	-1,082,274.00	-281.75	0.52	11,733.24
DebtToAssets	4,669	4.91	0.00	0.21	0.17	0.23
Sales	4,669	458,361.00	-0.29	6,709.75	1,030.79	22,332.98
Cash Surplus	4,669	39,864.00	-33,767.00	466.74	47.91	1,973.83
PriceToBook	4,669	133.19	0.14	2.06	1.59	2.28

Panel C: Market value to book value ratio, standard deviation of abnormal book-tax differences and control variables

Variable	N	Maximum	Minimum	Mean	Median	Std Dev
MarketToBook	4,112	12.09	0.58	1.90	1.58	1.11
BTDTEM	4,112	1.36	0.01	0.07	0.05	0.10
Size	4,112	322,560.00	11.19	7,722.20	1,471.18	21,899.44
ROA	4,112	0.60	0.00	0.08	0.07	0.06
Growth in SALE	4,112	826.19	-73.40	10.32	7.41	29.00
Dividend Cut	4,112	1.00	0.00	0.14	0.00	0.35
Debt To Assets	4,112	139.47	0.00	17.39	15.87	15.45
CAPX	4,112	39,260.60	0.05	462.49	48.39	2,012.33
Zscore	4,112	95.08	0.03	5.15	3.84	5.37
Cash Surplus	4,112	0.79	-0.27	0.08	0.08	0.07
CashToAssets	4,112	0.97	0.00	0.16	0.11	0.16
HighTaxPlanning	4,112	1.00	0.00	0.25	0.00	0.43

Table 2.3: Pearson correlations of key variables, 2004 - 2010

Panel A: insiders' stock option exercises, standard deviation of abnormal book-tax differences and control variables - Pearson correlations and p-value

	Pearson Correlation Coefficients, N = 5014										
	Prob > |r| under H0: Rho=0										
	OPT_EXD	BTD_TEM	OPTGR	DAT	CAPX	ROA	PTB	SIZE	EPS	D_SALE	HTAX PLANNIN
OPTEXD	1.000										
BTDTEM	0.042	1.000									
	0.003										
OPTGR	0.659	-0.029	1.000								
	<.0001	0.039									
DAT	-0.035	-0.122	-0.011	1.000							
	0.014	<.0001	0.452								
CAPX	0.226	-0.043	0.214	0.066	1.000						
	<.0001	0.002	<.0001	<.0001							
ROA	0.119	0.282	0.060	-0.258	0.013	1.000					
	<.0001	<.0001	<.0001	<.0001	0.367						
PTB	0.019	0.019	0.009	0.125	-0.011	0.101	1.000				
	0.176	0.173	0.534	<.0001	0.434	<.0001					
SIZE	0.348	-0.165	0.335	0.218	0.462	-0.046	0.009	1.000			
	<.0001	<.0001	<.0001	<.0001	<.0001	0.001	0.523				
EPS	0.009	0.000	-0.010	0.035	0.098	0.154	0.003	0.172	1.000		
	0.502	0.978	0.479	0.014	<.0001	<.0001	0.811	<.0001			
DSALE	0.040	-0.026	0.041	0.009	0.020	0.050	-0.007	0.071	0.019	1.000	
	0.004	0.070	0.004	0.547	0.163	0.000	0.616	<.0001	0.190		
HTAX_	0.000	-0.054	-0.010	0.096	0.043	-0.082	-0.020	0.033	-0.012	-0.002	1.000
PLANNING	0.974	0.000	0.496	<.0001	0.002	<.0001	0.159	0.019	0.384	0.888	

Panel B: Firm credit ratings, standard deviation of abnormal book-tax differences and control variables - Pearson correlations and p-value

Pearson Correlation Coefficients										
Prob > |r| under H0: Rho=0										
	SPDRC	BTD_ TEM	LOSS	CFO	STDROA	INTCOV	DAT	SALES	SCASH	MTB
SPDRC	1.0000									
BTD-TEM	0.1729 <.0001	1.0000								
LOSS	0.3816 <.0001	0.1502 <.0001	1.0000							
CFO	-0.4821 <.0001	-0.0540 <.0001	-0.1228 <.0001	1.0000						
STD-ROA	0.2544 <.0001	0.5540 <.0001	0.2451 <.0001	-0.0705 <.0001	1.0000					
INTCOV	-0.0089 0.5494	-0.0175 0.0857	-0.0500 <.0001	0.0075 0.4581	-0.0421 <.0001	1.0000				
DAT	0.4188 <.0001	0.0414 <.0001	0.1301 <.0001	0.0151 0.1097	0.0846 <.0001	0.0169 0.0965	1.0000			
SALES	-0.3980 <.0001	-0.0537 <.0001	-0.0898 <.0001	0.8053 <.0001	-0.0714 <.0001	0.0077 0.4504	0.0306 0.0012	1.0000		
SCASH	-0.4517 <.0001	-0.0459 <.0001	-0.1390 <.0001	0.9319 <.0001	-0.0602 <.0001	0.0064 0.5345	-0.0060 0.5303	0.6503 <.0001	1.0000	
MTB	-0.3269 <.0001	0.2051 <.0001	0.0403 <.0001	-0.0241 0.0108	0.3453 <.0001	-0.1203 <.0001	0.0592 <.0001	-0.0534 <.0001	-0.0004 0.9636	1.0000

Panel C: Firm credit ratings, standard deviation of abnormal book-tax differences and control variables - Pearson correlations and p-value

	Pearson Correlation Coefficients, N = 4112										
	Prob > |r| under H0: Rho=0										
	MTB	BTDTEM	SIZE	ROA	D_ SALE	Div. Cut	DAT	CAPX	Z_ SCORE	SCASH	CASH
MTB	1.000										
BTDTEM	0.046	1.000									
	0.003										
SIZE	-0.069	-0.071	1.000								
	<.0001	<.0001									
ROA	0.582	0.107	-0.025	1.000							
	<.0001	<.0001	0.109								
DSALE	0.149	0.099	-0.017	0.198	1.000						
	<.0001	<.0001	0.286	<.0001							
Dividend	-0.087	-0.058	0.073	-0.078	-0.110	1.000					
Cut	<.0001	0.000	<.0001	<.0001	<.0001						
DAT	-0.200	-0.069	0.091	-0.234	-0.052	0.076	1.000				
	<.0001	<.0001	<.0001	<.0001	0.001	<.0001					
CAPX	-0.057	-0.057	0.833	-0.005	0.007	0.059	0.051	1.000			
	0.000	0.000	<.0001	0.768	0.656	0.000	0.001				
ZSCORE	0.588	-0.012	-0.110	0.427	0.074	-0.066	-0.395	-0.072	1.000		
	<.0001	0.446	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001			
SCASH	0.513	0.025	-0.036	0.651	0.052	-0.040	-0.214	-0.012	0.358	1.000	
	<.0001	0.110	0.021	<.0001	0.001	0.011	<.0001	0.457	<.0001		
CASH	0.306	0.197	-0.136	0.285	0.073	-0.082	-0.430	-0.126	0.323	0.312	1.000
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	
HighTax	-0.069	0.247	-0.042	-0.039	0.074	0.015	0.061	-0.029	-0.093	-0.062	0.094
Planning	<.0001	<.0001	0.007	0.012	<.0001	0.333	<.0001	0.061	<.0001	<.0001	<.000

Table 2.4. Two models of firm level time series OLS Regression of Total Book-Tax income differences and accruals and their key factors

This table includes two models with fix one time panel regressions using total book-tax income differences or accruals as the dependent variable. In model 1 BTD_AT is Total Book-Tax difference normalized by total assets. DSALE_AT is the change in sale scaled by total assets. DPRBA_AT is the change on scaled the post retirement-fund status. DTLCF_AT is a change in tax loss carry forward scaled by total assets. PPENTPPEGT is ratio of PP&E (Net) to PP&E (Gross). PPEGT_AT represents the gross cost of tangible fixed property used in the production of revenue scaled by total assets PIFO is foreign pretax income scaled by total assets. DCLO_AT is the capitalized lease obligations normalized by total assets. NonGDWLINTAN_AT is the non good will intangible assets scaled by total assets. In model 2 CFO is cash flow from operations from the SFAS No. 95, Statement of Cash Flows; d$Sale_{i,t}$ are the change in sales in year t and $PPE_{i,t}$ are the level of property, plant, and equipment of firm i in year t. All variables are normalized by total assets. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1999 through 2010. The sample included 34,089 firm year observations.

Model 1		Model 2	
Dependent Variable: BTD_AT		Dependent Variable: CA_AT	
VarName	PARAM	VarName	PARAM
Intercept	0.007	Intercept	-0.002
	0.49		*-0.81*
DSALE_AT	-0.056***	CFO_AT	0.357***
	-15.46		*260.71*
DPRBA_AT	1.782***	LAGCFO_AT	-0.077***
	5.97		*-53.84*
DGDWL_AT	0.409***	LEADCFO_AT	-0.077***
	7.59		*-38.52*
PPENT_PPEGT	0.002	DSALE_AT	0.018***
	1.38		*8.44*
PPEGT_AT	0.065***	PPEGT_AT	-0.014***
	3.91		-6.44
PIFO_AT	0.980***		
	71.49		
DCLO_AT	-0.160		
	-1.00		
NonGDWLINTAN_AT	0.023		
	0.80		
R-Squared	0.1701		0.7345
Number of Obs	3099 x 11		3016 X 10

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively

Table 2.5. Regressions of Insiders' stock option exercises on earnings management measured by standard deviation of estimate errors of book-tax income differences, accruals and Abnormal accruals measured by absolute value of the residual

Insiders' stock option exercises – Optexd is the dependent variable. The key independent variables are standard deviation of abnormal book-tax income differences denoted as BTDTEM and ACCRUALS which is proxied by an alternative measure of accrual quality *at the firm-year level* measured by absolute value of the residual or abnormal accruals for that year. HightaxPlanning is a (01) dummy variable that has a value of 1 if the firm's effective tax rate is lower than the 1rd quintile, and 0 otherwise. LowSTDRES is a (01) dummy variable taking a value 1 if the StdRes is lower than the median, and 0 otherwise. LogOPTGR is natural logarithm of option grant. DAT is total debt to total assets. LogCAPX is natural logarithm of capital expenditure. ROA is return on assets. PTB is price to book ratio. Size is natural logarithm of total assets. OPEPS is basic EPS from operations. LogDSALE is growth in sale and is calculated as natural logarithm of ratio of $sale_t$ to $sale_{t-1}$. SIC2 is two digit industry codes, Compustat. R-squared, adjusted R-squared, estimated coefficients and associated t-value and number of observations for each model and specification are also reported. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1999 through 2010.

Dependent variables: Insiders' stock option exercises – Optexd								
		Book-Tax earnings management model				Abnormal Accruals model		
		Pooled OLS		FixTwo			Pooled OLS	FixTwo
Variable	Expected sign	Model 1	Model 2	Model 1	Model 2		Model 1	Model 1
Intercept	+ or -	-0.243***	-0.264***	-0.796***	-0.802***	Intercept	2.605***	10.878***
		-4.61	*-5.52*	*-3.41*	*-3.45*		(7.07)	(8.96)
BTDTEM	+	0.010*		-0.009		ACCRUALS	0.046***	0.009
		1.69		*-1.00*			(2.65)	(0.48)
HighTaxPlanning*BTDTEM	+		0.028***		0.024***			
			5.54		*4.15*			
LowTaxPlanning*BTDTEM	+ or -		0.009***		0.009**			
			2.87		*2.23*			
OPTGR (Options Granted)	+	0.338***	0.338***	0.050***	0.050***	OPTGR	0.306***	0.175***
		24.54	*24.99*	*4.05*	*4.00*		(8.13)	(2.64)
OPEPS	+ o r -	-0.002*	-0.002*	-0.002	-0.001	EPS	-0.397***	0.026
		-1.92	*-1.94*	*-0.98*	*-0.91*		(-6.58)	(0.21)
ROA	+	0.003***	0.003***	0.002***	0.002***	ROA	0.168***	0.053
		7.97	*8.62*	*5.63*	*5.94*		(3.84)	(1.16)
Dividend	-	-0.000	-0.001	-0.005	-0.005	Dividend	-0.008	0.031
		-0.07	*-0.27*	*-0.75*	*-0.72*		(-0.67)	(0.81)

Table 2.5. (continued)

Variable	Expected sign	Model 1	Model 2	Model 1	Model 2		Model 1	Model 1
CAPX	-	0.008	0.007	-0.023**	-0.022**	LogCAPX	0.010	0.001
		1.15	*1.04*	*-2.24*	*-2.16*		(0.29)	(0.02)
Size	+ or -	0.092***	0.092***	0.170***	0.176***	Size	-0.279***	-1.375***
		12.02	*12.17*	*9.38*	*9.73*		(-5.29)	(-11.13)
PTB	+	0.134***	0.133***	0.158***	0.156***	PTB	0.348***	0.374***
		16.80	*16.86*	*15.31*	*15.14*		(6.87)	(5.75)
LagOptexd	+	0.132***	0.132***	0.010**	0.010**	LagOptexd	0.266***	-0.041***
		28.98	*29.10*	*2.45*	*2.43*		(5.83)	(-3.77)
	+ or -	-						
HighTaxPlanning		0.060***		-0.061***				
		-4.58		*-3.94*				
Industry dummies		Yes	Yes				Yes	
Year fixed dummies		Yes	Yes				Yes	
Adj R-squared		0.6666	0.6670	0.0.8291	0.8292		0.2419	0.7026
Obs.		5,014	5,014	836 x 6	836 x 6		4,499	749 x 6

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively

Table 2.5a. Regressions of Insiders' stock option exercises on earnings management measured by standard deviation of estimate errors of book-tax income differences, accruals and control variables

Insiders' stock option exercises – Optexd is the dependent variable. The key independent variables are standard deviation of abnormal book-tax income differences denoted as BTDTEM and Abnormal ACCRUALS hich is proxied by accrual quality *at the firm-year level* measured by the *standard deviation* of the residuals for that year. HightaxPlanning is a (01) dummy variable that has a value of 1 if the firm's effective tax rate is lower than the 1rd quintile, and 0 otherwise. LowSTDRES is a (01) dummy variable taking a value 1 if the StdRes is lower than the median, and 0 otherwise. LogOPTGR is natural logarithm of option grant. LogCAPX is natural logarithm of capital expenditure. ROA is return on assets. PTB is price to book ratio. Size is natural logarithm of total assets. OPEPS is basic EPS from operations. SIC2 is two digit industry codes, Compustat. R-squared, adjusted R-squared, estimated coefficients and associated t-value and number of observations for each model and specification are also reported. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1999 through 2010.

Dependent variables: Insiders' stock option exercises – Optexd							
		Book-Tax earnings management model				Accruals Quality model	
		Pooled OLS		FixTwo		Pooled OLS	FixTwo
Variable	Expected sign	Model 1	Model 2	Model 1	Model 2	Model 1	Model 1
Intercept	+ or -	-0.243***	-0.264***	-0.796***	-0.802***	-0.666***	-1.101***
		-4.61	*-5.52*	*-3.41*	*-3.45*	-8.33	-3.51
BTDTEM	+	0.010*		-0.009		-0.016*	-0.026*
		1.69		*-1.00*		-1.67	-1.91
HighTaxPlanning*BTDTEM	+		0.028***		0.024***		
			5.54		*4.15*		
LowTaxPlanning*BTDTEM	+ or -		0.009***		0.009**		
			2.87		*2.23*		
OPTGR (Options Granted)	+	0.338***	0.338***	0.050***	0.050***	0.296***	0.017
		24.54	*24.99*	*4.05*	*4.00*	16.00	1.07
OPEPS	+ o r -	-0.002*	-0.002*	-0.002	-0.001	-0.175***	0.044
		-1.92	*-1.94*	*-0.98*	*-0.91*	-8.46	1.53
ROA	+	0.003***	0.003***	0.002***	0.002***	0.107***	0.040***
		7.97	*8.62*	*5.63*	*5.94*	9.53	3.56
Dividend	-	-0.000	-0.001	-0.005	-0.005	-0.011***	-0.015
		-0.07	*-0.27*	*-0.75*	*-0.72*	-2.58	-1.64
CAPX	-	0.008	0.007	-0.023**	-0.022**	-0.030***	-0.034***
		1.15	*1.04*	*-2.24*	*-2.16*	-6.97	-5.26

Table 2.5a. (continued)

Variable	Expected sign	Model 1	Model 2	Model 1	Model 2	Model 1	Model 1
Size	+ or -	0.092***	0.092***	0.170***	0.176***	-0.011	-0.048***
		12.02	*12.17*	*9.38*	*9.73*	-1.24	-3.20
PTB	+	0.134***	0.133***	0.158***	0.156***	0.185***	0.224***
		16.80	*16.86*	*15.31*	*15.14*	15.22	7.61
LagSTDRES	+	0.132***	0.132***	0.010**	0.010**	0.106***	0.158***
		28.98	*29.10*	*2.45*	*2.43*	9.19	9.70
HighTaxPlanning	+ or -	-0.060***		-0.061***			
		-4.58		*-3.94*			
Industry dummies		Yes	Yes			Yes	
Year fixed dummies		Yes	Yes			Yes	
Adj R-squared		0.6666	0.6670	0.0.8291	0.8292	0.7149	0.8659
Obs.		5,014	5,014	836 x 6	836 x 6		4,499

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively

Table 2.6. Ordered Logit regression of firm's credit rating on earnings management measured by standard deviation of estimate errors of total book-tax differences and Abnormal accruals measured by absolute value of the residual

This table shows ordered logit regressions using Firm's Credit ratings – SPDRC as dependent variable and standard deviation of total book-tax income differences – BTDTEM along with Abnormal ACCRUALS as the key independent variables. Abnormal ACCRUALS is proxied by an alternative measure of accrual quality *at the firm-year level* measured by *absolute value* of the residual or abnormal accruals for that year. Loss is dummy variable taking value of 1 if OPEPS is negative and 0 otherwise. dCFO is the change in operating cash flow. STDROA is the firm i's standard deviation of ROA from year t-1 to year t which is calculated using five years data from year t-4 to t. INTCOV is the interest coverage ratio which is calculated as operating income before depreciation divided by interest expense at the end of year t. BLEV is book leverage calculated as total debt divided by book value of total assets. DSALE is grown in sale which is a natural logarithm of sale in year t divided by sale in year t-1. SCASH_AT is cash surplus calculated as cash from assets-in-place to total assets. MTB is market to book ratio. HTAXPLANNING is high tax planning dummy variable taking value of 1 if the firm has an average of effective tax rate from year t-4 to year t below 1st quintile and 0 otherwise. SIC2 is dummy variable at two digits SIC code from Compustat, taking value of 1 if firm I is a member of industry j; zero otherwise. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1999 through 2010. The sample included 4,669 observations.

Dependent variables: Firm's Credit ratings – SPDRC					
	Book-tax earnings management model			Abnormal Accrual model	
Variable	Expected sign	Model 1	Model 2		Model 1
Intercept	+ or -	-5.074***	-4.699***	Intercept	7.0027***
		42.08	*37.141*		*748.85*
BTDTEM	-	-0.172***		ACCRUALS	-1.4493***
t-value		*11.33*		*Chi-Square*	*3.82*
HighTaxPlanning*BTDTEM	+		0.095***		
t-value			*7.982*		
LowTaxPlanning*BTDTEM	+ or -		0.024		
t-value			*1.102*		
Loss	-	-0.264**	-0.258**	Loss	-0.6722***
t-value		*5.191*	*4.903*	*Chi-Square*	*6.76*
dCFO	+	0.694***	0.688***	dCFO	0.0020***
t-value		*50.10*	*49.35*	*Chi-Square*	*7.59*
STDROA	-	-0.426***	-0.482***	STDROA	-0.0268***
t-value		*108.63*	*163.37*	*Chi-Square*	*76.79*
INTCOV	+	0.710***	0.732***	INTCOV	-0.0185***
t-value		*190.00*	*202.67*	*Chi-Square*	*76.96*
BLEV	-	0.035	0.047	BLEV	-0.0212***
t-value		*0.489*	*0.859*	*Chi-Square*	*303.78*

Table 2.6. (continued)

Variable	Expected sign	Model 1	Model 2		Model 1
DSALE	+	1.238***	1.282***	DSALE	-0.0781
t-value		*200.45*	*216.89*	*Chi-Square*	*20.63*
SCASH_AT	+	0.147**	0.142**	SCASH_AT	4.5224***
t-value		*6.175*	*5.760*	*Chi-Square*	*225.36*
MTB	+	0.668***	0.654***		
t-value		*211.34*	*204.32*		
HighTAXPLANNING	-	-0.225**			
t-value		*5.669*			
Industry dummy		YES	YES		YES
YearDummy		YES	YES		YES
Obs		4,669	4,669		4,669

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively

Table 2.6a. Ordered Logit regression of firm's credit rating on earnings management measured by standard deviation of estimate errors of total book-tax differences and control variables

This table shows ordered logit regressions using **Firm's Credit ratings – SPDRC** as dependent variable and standard deviation of total book-tax income differences as the key independent variable. ACCRUALS is measured by the ***standard deviation*** of the residuals as a firm-specific measure of accrual quality. Loss is dummy variable taking value of 1 if OPEPS is negative and 0 otherwise. dCFO is the change in operating cash flow. STDROA is the firm i's standard deviation of ROA from year t-1 to year t which is calculated using five years data from year t-4 to t. INTCOV is the interest coverage ratio which is calculated as operating income before depreciation divided by interest expense at the end of year t. BLEV is book leverage calculated as total debt divided by book value of total assets. DSALE is grown in sale which is a natural logarithm of sale in year t divided by sale in year t-1. SCASH_AT is cash surplus calculated as cash from assets-in-place to total assets. MTB is market to book ratio. HTAXPLANNING is high tax planning dummy variable taking value of 1 if the firm has an average of effective tax rate from year t-4 to year t below 1st quintile and 0 otherwise. SIC2 is dummy variable at two digits SIC code from Compustat, taking value of 1 if firm I is a member of industry j; zero otherwise. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000-6999) by the period 1999 through 2010. The sample included 4,112 observations.

Dependent variables: Firm's Credit ratings – SPDRC					
	Book-tax earnings management model			Accruals Quality model	
Variable	Expected sign	Model 1	Model 2		Model
Intercept	+ or -	-5.074***	-4.699***	Intercept	6.4936***
		42.08	*37.141*		*869.56*
BTDTEM	-	-0.172***		ACCRUALS	-15.1153***
		11.33			*193.61*
HighTaxPlanning*BTDTEM	+		0.095***		
			7.982		
LowTaxPlanning*BTDTEM	+ or -		0.024		
			1.102		
Loss	-	-0.264**	-0.258**	Loss	-0.6635***
		5.191	*4.903*		*7.28*
dCFO	+	0.694***	0.688***	dCFO	0.0029***
		50.10	*49.35*		*7.77*
STDROA	-	-0.426***	-0.482***	STDROA	-0.0174***
		108.63	*163.37*		*37.87*
INTCOV	+	0.710***	0.732***	INTCOV	0.0139***
		190.00	*202.67*		*38.90*
BLEV	-	0.035	0.047	BLEV	-0.0217***
		0.489	*0.859*		*396.59*
DSALE	+	1.238***	1.282***	DSALE	-0.0576
		200.45	*216.89*		*2.02*

Table 2.6a (continued)

Variable	Expected sign	Model 1	Model 2		Model
SCASH_AT	+	0.147**	0.142**	SCASH_AT	3.5139***
		6.175	*5.760*		*142.30*
MTB	+	0.668***	0.654***		
		211.34	*204.32*		
HighTAXPLANNING	-	-0.225**			
		5.669			
Industry dummy		YES	YES		YES
YearDummy		YES	YES		YES

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively

Table 2.7. OLS regressions of firm value on earnings management. Accruals measured by absolute value of the residual or abnormal accruals

This table shows OLS regressions model using Market value To Book value as dependent variable and BTDTEM - standard deviation of abnormal book-tax income differences - in year t, t-1, t-12 and t-3 and Accruals measured by *absolute value* of the residual or abnormal accruals as the key independent variables. Size is natural logarithm of total assets. ROA is return on assets. DSALE is grow in sale and is calculated as natural logarithm of ratio of $sale_t$ to $sale_{t-1}$. Dividend cut is an indicator variable that takes the value of 1 if there is a reduction in annual dividend, and 0 otherwise. Book leverage is total debt to book value of total assets. Market leverage is total debt to market value of total assets. CAPEX is net capital expenditure to assets. Z-score is a bankruptcy index developed by Edward Altman in which higher value of Z-score, lower probability of bankruptcy. NOLA is net operating loss carry forward to assets. SCASH is cash surplus calculated as cash from assets-in-place to total assets. HTAXPLANNING is a high tax planning dummy variable which takes value of 1 if the firm has an average of effective tax rate from year t-3 to year t below 1st quintile and 0 otherwise. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000- 6999) by the period 1999 through 2010. The sample included 4,112 observations.

	Dependent variables: Market value To Book value - MTB					
	Book-tax earnings management model			Abnormal Accruals model		
Variable	Expected signs	Pooled OLS	FixTwo	Variable	Pooled OLS	FixTwo
Intercept	+ or -	-0.290***	-0.453***	Intercept	-1.004***	-1.105***
		-4.204	-2.73		(-9.11)	(-4.21)
BTDTEM	+	0.019*	0.031***	Accruals	0.010*	0.004
		1.664	3.25		(1.78)	(0.80)
Lag1(BTDTEM)	-	-0.024*	-0.013*	Lag1(Accruals)	-0.002	-0.010**
		-1.656	-1.66		(-0.39)	(-2.04)
Lag2(BTDTEM)	+ or -	-0.004	-0.020**	Lag2(Accruals)	-0.006	-0.011**
		-0.304	2.48		(-0.98)	(-2.25)
Size	+	0.025***	-0.118***	Size	0.019***	-0.143***
		7.071	-5.81		(3.15)	(-4.59)
ROA	+	0.032***	-0.006	ROA	0.157***	0.050***
		3.968	-1.23		(10.40)	(5.67)
Grows in SALE	+	0.196***	0.130***	Grow in SALE	0.314***	0.032
		6.530	7.48		(6.67)	(0.91)
Dividend cut	-	-0.031**	-0.001	Dividend Cut	-0.037*	-0.021
		-2.451	-0.05		(-1.72)	(-1.11)
Book Leverage	+	0.022***	0.105***	Book Leverage	0.002***	0.003***
		17.522	14.05		(2.62)	(3.22)
CAPEX	+	0.025***	0.012	CAPEX	0.046***	-0.026**
		4.685	1.43		(4.45)	(-2.04)
Zscore	+	0.352***	0.499***	LogZscore	0.609***	0.779***
		16.477	33.91		(16.17)	(31.10)

Table 2.7. (continued)

Variable	Expected signs	Pooled OLS	FixTwo	Variable	Pooled OLS	FixTwo
NOLA	+ or -	0.192***	-0.015	NOLA	0.429***	0.368***
		3.660	-0.28		(5.90)	(4.43)
Cash Surplus	+	1.184***	0.060	CASH Surplus	1.355***	0.254**
		10.043	0.86		(7.56)	(2.28)
Cash to total	+			Cash to total		
Assets		0.012***	0.001	assets	0.035***	-0.002
		3.245	0.11		(4.86)	(-0.19)
HTAXPLANNING	+	0.039***	0.026**			
		3.114	2.30			
Industry dummies		Yes			Yes	
Year dummies		Yes			Yes	
R Squared		0.6830	0.9232		0.7219	0.9366
Adj. R-Squared		0.6813			0.7157	

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively

Table 2.7a. OLS regressions of firm value on earnings management. Accruals is measured by the *standard deviation* of the residuals

This table shows OLS regressions model using **Market value To Book value** as dependent variable and BTDTEM - standard deviation of abnormal book-tax income differences - in year t, t-1, t-12 and t-3 as the key independent variables. ACCRUALS is measured by the standard deviation of the residuals as a firm-specific measure of accrual quality. Size is natural logarithm of total assets. ROA is return on assets. DSALE is grow in sale and is calculated as natural logarithm of ratio of $sale_t$ to $sale_{t-1}$. Dividend cut is an indicator variable that takes the value of 1 if there is a reduction in annual dividend, and 0 otherwise. Book leverage is total debt to book value of total assets. Market leverage is total debt to market value of total assets. CAPEX is net capital expenditure to assets. Z-score is a bankruptcy index developed by Edward Altman in which higher value of Z-core, lower probability of bankruptcy. NOLA is net operating loss carry forward to assets. SCASH is cash surplus calculated as cash from assets-in-place to total assets. CASH is Cash to Assets. HTAXPLANNING is a high tax planning dummy variable which takes value of 1 if the firm has an average of effective tax rate from year t-3 to year t below 1st quintile and 0 otherwise. All COMPUSTAT reporting firms with market value greater the 100 million dollars are included except regulated (SICs 4900-4999) and financial firms (SICs 6000-6999) by the period 1999 through 2010. The sample included 4,112 observations.

Dependent variables: Market value To Book value - MTB						
	Book-tax earnings management model			Accruals Quality model		
Variable	Expected signs	Pooled OLS	FixTwo	Variable	Pooled OLS	FixTwo
Intercept	+ or -	-0.290***	-0.453***	Intercept	-0.567***	-0.101
		-4.204	-2.73		*-8.028*	-0.39
BTDTEM	+	0.019*	0.031***	Accruals	-0.045***	-0.023*
		1.664	3.25		*-2.691*	-1.67
Lag1(BTDTEM)	-	-0.024*	-0.013*	Lag1(Accruals)	-0.029	-0.002
		-1.656	-1.66		*-1.220*	-0.13
Lag2(BTDTEM)	+ or -	-0.004	-0.020**	Lag2(Accruals)	0.006	-0.011
		-0.304	2.48		*0.275*	-0.94
Lag3(BTDTEM)	+ or -	0.012	-0.002	Lag3(Accruals)	0.006	0.006
		1.245	-0.21		*0.407*	0.49
Size	+	0.025***	-0.118***	Size	0.025***	-0.024
		7.071	-5.81		*5.004*	-0.76
ROA	+	0.032***	-0.006	ROA	0.036***	-0.011
		3.968	-1.23		*3.253*	-1.53
Grows in SALE	+	0.196***	0.130***	Grow in SALE	0.241***	0.042*
		6.530	7.48		*6.049*	1.69
Dividend cut	-	-0.031**	-0.001	Dividend Cut	-0.027	0.016
		-2.451	-0.05		*-1.613*	1.19
Book Leverage	+	0.022***	0.105***	Book Leverage	0.015***	0.112***
		17.522	14.05		*5.702*	11.33
Market Leverage	-	-2.665***	-1.177***	Market Leverage	-1.828***	-0.770***
		-17.628	-10.62		*-6.735*	-5.49

Table 2.7a. (continued)

Variable	Expected signs	Pooled OLS	FixTwo	Variable	Pooled OLS	FixTwo
CAPEX	+	0.025***	0.012	CAPEX	0.029***	-0.025**
		4.685	1.43		*3.496*	-2.29
Zscore	+	0.352***	0.499***	Zscore	0.368***	0.656***
		16.477	33.91		*19.161*	28.76
NOLA	+ or -	0.192***	-0.015	NOLA	0.263***	0.215***
		3.660	-0.28		*3.490*	2.72
Cash Surplus	+	1.184***	0.060	CASH Surplus	1.171***	0.238***
		10.043	0.86		*7.531*	2.72
Cash to total Assets	+	0.012***	0.001	Cash to total assets	0.009*	-0.004
		3.245	0.11		*1.806*	-0.62
HTAXPLANNING	+	0.039***	0.026**			
		3.114	2.30			
Industry dummies		Yes	YES		Yes	
Year dummies		Yes	NO		Yes	
R Squared		0.6830	0.9232		0.6839	0.9476
Adj. R-Squared		0.6813			0.6811	

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively

VITA

Quang Viet Vu was born on December 27, 1968 in Vietnam. He received his PhD in Finance from Old Dominion University in 2012, his M.S. degree (with honors) from Hochiminh University of Economics in 2005 and B.S. (with honors) from Hochiminh University of Economics in 2000. After his undergraduate work, he has been employed by Hochiminh University of Economics as a lecturer and he has pursued an academic career since then. His fields of lecture are Corporate Finance and Financial Modeling. His primary research interests include behavioral finance, international finance, and asset pricing.