EXECUTIVE COMPENSATION AND IDIOSYNCRATIC RISK

by

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ABSTRACT

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Executive compensation is a very heavily researched area in finance, accounting and management over the last three decades. However, there are several inconclusive issues. One of them is the relationship between idiosyncratic risk and executive compensation. Prior research findings on this issue are inconclusive. In this context, this dissertation analyzes the effects of idiosyncratic risk on executive compensation. This research seeks to discover and document the role of idiosyncratic risk on all top executive compensation, CEO compensation and non-CEO executive compensation. This study will begin with an extensive review of prior studies on executive pay to identify the determinants of executive pay. Based on the prior research, this study uses the most inclusive model to find the role of idiosyncratic risk on executive pay. This research finds that there is a positive effect of idiosyncratic risk on executives' salary, bonus, equity and total compensation. When we analyze the impact of idiosyncratic risk on CEO's and non-CEO executives' compensation separately, our main findings remain unchanged. We find that idiosyncratic volatility has a positive effect on executives', CEO and non-CEO executives' salary, bonus, equity and total compensation.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Although executive compensation is one of the most heavily researched fields in finance, debate over executive compensation has been intensifying in recent years, especially in the context of the last financial crisis. Politicians, policy-makers and researchers have been exploring the role of top executives on the financial crisis. Moreover, there have been intense debates over the role of executive pay set up on excessive risk taking by public firms. Given these debates, the main objective of this dissertation is to examine the effects of idiosyncratic risk on executive pay in public firms.

1.1.1 Role of Top Executives on the Financial Crisis

The world economy faced a major setback during the financial crisis in 2008-2009. Many economists believe the recent financial crisis was the worst since the depression of the 1930s[1]. The crisis started as a result of a liquidity shortfall in financial institutions in the United States of America resulting in severe damage to the world economy. This contributed to key business failures and a significant decline in economic activities. As a result, world economies faced a sharp decline in stock markets resulting in trillions of dollars losses to individuals, households, and institutions. Seventeen trillion dollars in household wealth evaporated within 21

1 Please see Three Top Economists Agree 2009 Worst Financial Crisis Since Great Depression: Risks Increase if Right Steps are Not Taken, February 27, 2009, Retrieved on April 1, 2011 form Business Wire News database <http://www.reuters.com/article/2009/02/27/idUS193520+27-Feb-2009+BW20090227>.

months, and reported unemployment hit 10.1% at its peak in October 2010 in the United States. As a result of the financial crisis, financial firms lost billions of dollars. According to IMF Global Financial Report 2010, crisis-related bank write-downs and loan provisions in the economies hit hardest from the crisis between 2008 and 2010 have been $2.2 trillion. In addition, banks are in the process of realizing write-downs of approximately $550 billion[2].

The crisis can be attributed to a number of factors pervasive in both housing and credit markets. There are several explanations regarding the cause of the crisis. According to the Financial Crisis Inquiry Commission, the causes of the financial and economic crisis were widespread failures in financial regulation, including the Federal Reserve's failure to stem the tide of toxic mortgages; dramatic breakdowns in corporate governance, including too many financial firms acting recklessly and taking on too much risk; an explosive mix of excessive borrowing and risk taking by households and Wall Street that put the financial system on a collision course with crisis; key policy-makers ill prepared for the crisis, lacking a full understanding of the financial system they oversaw; and systemic breaches in accountability and ethics at all levels[3].

Financial institutions were engaged in very risky practices for years. Trillions of dollars in risky mortgages had become embedded throughout the financial system, as mortgage-related securities were packaged, repackaged, and sold to investors around the world. When the bubble burst, hundreds of billions of dollars in losses in mortgages and mortgage-related securities shook markets as well as financial institutions that had significant exposure to those mortgages and had borrowed heavily against them[4]. According to the Financial Crisis Inquiry Commission Report (2011), many financial institutions acted recklessly, taking too much risk,

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2 International Monetary Fund, Global Financial Stability Report, October, 2010, Retrieved on April 1, 2011 < http://www.imf.org/external/pubs/ft/gfsr/2010/02/pdf/text.pdf >.
3 Financial Crisis Inquiry Commission, Releases Report on the Causes of the Financial Crisis, January 27, 2011, Retrieved on April 1, 2011 < http://c0186234.cdn1.cloudfiles.rackspacecloud.com/2011-0127-fcic-releases-report.pdf>.
4 Financial Crisis Inquiry Commission, Financial Crisis Inquiry Report, January, 2011, Retrieved on April 1, 2011 < http://c0182732.cdn1.cloudfiles.rackspacecloud.com/fcic_final_report_full.pdf >.

with too little capital, and with too much dependence on short-term funding. They took on enormous exposures in acquiring and supporting subprime lenders and creating, packaging, repackaging, and selling trillions of dollars in mortgage-related securities, including synthetic financial products. Thus, the key aspect of the crisis was the increased use by banks of short-term wholesale funding and the risks that were posed when these short-term markets dried up (IMF, 2010).

Moreover, there were instances of governance breakdowns and irresponsibility in financial institutions. For example, AIG's senior management was ignorant of the terms and risks of the company's $79 billion derivatives exposure to mortgage-related securities. Merrill Lynch's top management was ignorant that the company held $55 billion in mortgage-related securities. Before the crisis, Citi Bank had over $40 billion in mortgage-backed securities (Financial Crisis Inquiry Commission Report, 2011). Nearly all major financial institutions invested heavily in mortgage-related securities without diversifying their risk exposure.

Another cause of the financial crisis was a combination of excessive borrowing, risky investments, and lack of transparency in the financial system. Many financial institutions borrowed too much leaving them vulnerable to financial distress or ruin if the value of their investments declined even modestly. For example, as of 2007 the five major investment banks – Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley – were operating with 40 to 1 leverage ratios making them vulnerable to collapse in case the asset value dropped less than three percent. As of the end of 2007, Bear Stearns had $11.8 billion in equity and $383.6 billion in liabilities and was borrowing as much as $70 billion in the overnight market (Financial Crisis Inquiry Commission Report, 2011). These figures clearly show the vulnerability of these financial institutions.

As noted by the Financial Crisis Inquiry Commission Report, dramatic breakdowns in corporate governance, including too many financial firms acting recklessly and taking on too much risk, clearly manifests the role of financial firms in the financial meltdown. This fact shows that the financial crisis was largely facilitated by liquidity shortfalls in financial institutions. Several large financial firms failed in Iceland, Spain, Germany, the United Kingdom, and United States, among others in the early stage of financial meltdown. Many financial firms were on the verge of collapse in the absence of government support.

The analysis above clearly shows that the problems in the financial sector were the heart of the financial crisis. The financial crisis in 2008 was the result of excessive risk taking practices of top executives in financial firms. Many financial firms would not have survived if they had not received government support. Therefore, it is very important to analyze the main cause of liquidity shortfalls in financial institutions. Why did financial firms face liquidity crisis? Who is responsible for that?

It is obvious that senior management in any institution is responsible for major decisions and should be responsible for the actions taken. Although some executives do not see lack of corporate governance and risk management as major sources of crisis, Jamie Dimon, the former CEO of JP Morgan, in his testimony to the FCIC asserts that the management team is 100% responsible for the crisis (Financial Crisis Inquiry Commission Report, 2011, p.18). The Financial Crisis Inquiry Commission Report also states that the crisis was a result of human mistakes, misjudgments, and misdeeds that resulted in systemic failures for which our nation has paid dearly. As President Obama remarks in his Wall Street reform speech in April 2010, salaries and bonuses practices in public firms created perverse incentives to take reckless risks that contributed to the crisis[5].

1.1.2 Does Compensation Drive Risk?

Whether or not executive compensation is a driving factor of risk is a subject of intense debate in recent years, especially in light of recent financial crisis. Policy-makers are very critical about the role of risk-taking behavior of executives in financial firms. For example, President Obama (2010) in his remarks on the passage of the Financial Regulatory Bill remarks

5 See Remarks by the President on Wall Street Reform, April 22, 2010, Retrieved on April 1, 2011 < http://www.whitehouse.gov/the-press-office/remarks-president-wall-street-reform>

that it was clear from the moment it began that this recession was not the result of your typical economic downturn. He further states that the current recession was the result of recklessness and irresponsibility in certain corners of Wall Street that infected the entire economy - irresponsibility that cost millions of Americans their jobs and millions more their hard-earned savings[6]. Similarly, Mary Schapiro, the chairman of the Securities and Exchange Commission, remarks that the large short-term incentive compensation packages of the last few years juxtaposed with the recent losses in shareholder value have left many investors asking important questions about their company's compensation practices and whether some incentives are actually undermining shareholder value over the long term[7]. These remarks clearly indicate the indirect link between the financial crisis and top executives' pay in financial institutions.

According to the Financial Crisis Inquiry Commission Report, executive compensation systems designed in an environment of cheap money, intense competition, and light regulation too often rewarded the quick deal and the short-term gain without proper consideration of long-term consequences. The Report further states that often the compensation systems encourage the big bet where the payoff on the upside could be huge and the downside limited.

Congresswoman McCarthy, in her June 11, 2009 statement in the hearing on Compensation Structure and Systematic Risk, expresses the necessity for tools necessary to create an adequate compensation system that is based on performance principles and not on incentives backed by excessively risky business decisions[8]. Congressman Charlie Wilson has a similar view. He remarks that the current financial crisis is a result of Wall Street firms' practice

6 See Remarks by the President on the Passage of Financial Regulatory Reform, July 15, 2010 < http://www.whitehouse.gov/the-press-office/remarks-president-passage-financial-regulatory-reform>.
7 See Chairman Schapiro Statement on Executive Compensation, June 10, 2009 < http://www.sec.gov/news/press/2009/2009-133.htm >.
8 See Opening Statement by Representative Carolyn McCarthy on Committee on Financial Services, June 11, 2009, < http://www.house.gov/apps/list/hearing/financialsvcs_dem/statement_-_carolyn_mccarthy.pdf >.

of rewarding its employees for risky behavior with outrageous bonuses[9]. Congresswoman Speier sees clear disconnection between performance and compensation. However, she does not believe that the demise of the financial services industry is the direct result of executive compensation being tied to more and more risk[10].

Sperling (2009), in his written testimony before the Committee on Financial Services, remarks that there is little question that one contributing factor to the excessive risk taking that was central to the crisis was the prevalence of compensation practices at financial institutions that encouraged short-term gains to be realized with little regard to the potential economic damage such behavior could cause not only to those firms, but to the financial system and economy as a whole[11]. Alvarez (2009) argues that recent events have highlighted that improper compensation practices can contribute to safety and soundness problems at financial institutions and to financial instability. However, he asserts that compensation practices were not the sole cause of the crisis[12].

Academicians are also divided on the role of executive pay practices on risk taking. In a written testimony before the Committee on Financial Services, Professor Bebchuk (2010) remarks that standard compensation arrangements in publicly traded firms have rewarded executives for short-term results even when these results were subsequently reversed. Such arrangements have provided executives with excessive incentives to focus on short-term results[13]. Similarly, Bebchuk, Cohen and Spamann (2010) suggest that the executives' pay arrangements provide executives with excessive risk-taking incentives. However, another

9 Please see Opening Statement by Congressman Charlie Wilson Committee on Financial Services, June 11, 2009, < http://www.house.gov/apps/list/hearing/financialsvcs_dem/statement_-_charlie_wilson.pdf >.
10 Please see Congresswoman Speier Statement for Financial Services Committee hearing: Compensation Structure and Systemic Risk, June 11, 2009, <http://www.house.gov/apps/list/hearing/financialsvcs_dem/statement_-_jackie_speier.pdf >.
11 See Written Testimony Submitted by Gene Sperling, Counselor to the Secretary of the Treasury, U.S. Department of the Treasury, Before the Committee on Financial Services: U.S. House of Representatives on June 11, 2009.
12 Statement of Scott G. Alvarez, General Counsel, Board of Governors of the Federal Reserve System before the Committee on Financial Services, U.S. House of representatives, June 11, 2009 <http://www.house.gov/apps/list/hearing/financialsvcs_dem/alvarez_-_frb.pdf>.
13 Written Testimony Submitted by Professor Lucian A. Bebchuk, Before the Committee on Financial Services, January 22, 2010, <http://www.house.gov/apps/list/hearing/financialsvcs_dem/bebchuk.pdf >.

prominent academician, Professor Murphy (2009), sees limited evidence on the contribution of compensation on excessive risk taking in the financial industry. According to Murphy (2009), the heavy reliance on bonuses has been a defining feature of Wall Street compensation for decades and the basic structure remains intact. He argues that the primary way that compensation structures might encourage excessive risk taking is through high rewards for superior performance but no real penalties for failure. According to Murphy (2009), however, financial services firms provide significant penalties for failure in their cash bonus plans by keeping salaries below competitive market levels, so that earning a zero bonus represents a penalty.

In conclusion, even though there are diverse opinions regarding the role of executive pay set up on executive risk taking behavior, we may not discard the role of executive pay set up on executive risk taking behavior. During the financial crisis several financial firms were vulnerable to collapse if governments had not supported them. Several financial firms were losing billions of dollars. However, many executives in those firms were still receiving huge amounts of compensation in the form of bonuses and other benefits which outraged the public and policy-makers.

In response to the recent financial meltdown, after several testimonies, discussions, debates, and arguments, Congress passed a financial overhaul bill on July 15, 2010. This bill imposes the stiffest restrictions on banks and Wall Street since the Great Depression, clamping down on lending practices and expanding consumer protections to prevent a repeat of the 2008 meltdown that knocked the economy to its knees. According to the bill, a powerful council of regulators will look out for risks across the financial system. Large, failing financial institutions will be liquidated and the costs assessed on their surviving peers. In addition, the Federal Reserve will get new powers while falling under greater Congressional scrutiny. There are several stiffer provisions, including consumers' protection.

1.1.3 Current Status of Risk and Executive Compensation Relationship

Two of the most widely tested predictions of agency theory are that there exists a negative tradeoff between risk and incentives and managerial incentives enhance firm performance. Most of the prior research focuses on the link between risk and compensation, and very few studies focus on idiosyncratic risk. Empirical evidence is mixed. Garen (1994), Yermack (1995), Bushman, Indjejikian, Smith (1996), Ittner, Lacker, Rajan (1997), and Conyon and Murphy (1999) find no relation between executive pay and firm risk. Eaton and Rosen (1983), Demsetz and Lehn (1985), Lewellen, Loderer, and Martin (1987), Core and Guay (1999a, 1999b, 2002), Prendergast (2000, 2002) find a positive relationship between executive pay and firm risk. However, Lambert and Larcker (1987), Aggarwal and Samwick (1999, 2002), Mishra, McConaughy and Gobeli (2000), Jin (2002), and Garvey and Milbourn (2003) find a negative effect of firm risk on executive pay. Thus, the current status of research on firm risk and executives' compensation is inclusive. Therefore, we need very comprehensive research that addresses all of the shortcomings of prior studies and defines the risk and compensation relationship clearly.

1.1.4 Motivation and Research Questions

Prior studies on risk and compensation fail to explain the effects idiosyncratic risk on executive pay. In light of the recent financial crisis, it is very important to explore the effects of idiosyncratic risk on executive pay. There are concerns and questions about the accountability of the top executives in public firms. Are the managers accountable for any loss to the firm due to their actions? Why do the managers engage in very risky investment practices? Does our compensation system incorporate management's risk-taking behavior in pay performance set up? How can we make executives more responsible for their actions when they make decisions? These are the common concerns among academics, policy-makers and the public. Therefore, the ongoing debate on the role of executive pay practices on the financial crisis is the key motivation of this research. In this context, this dissertation aims at investigating the effects of idiosyncratic risk on top executives' pay in public corporations in light of extensive debate on the role of executive pay practices on the recent financial meltdown.

There are several unanswered questions on the link between firm risk and executive pay. What is the exact relationship between executive pay and idiosyncratic risk? Does the existing compensation structure reward for performance and panelize for failure? Does executive pay structure focus on short-term performance? Is there any link between risk taking practices and idiosyncratic risk in financial firms? What is the role of idiosyncratic risk in financial firms and firms in other industries? Does the effect of idiosyncratic risk differ on financial firms and other industries? Does idiosyncratic risk affect new and old economy firms differently? What is the role of idiosyncratic risk on executive pay during economic downturns and good economic times? Are there any changes in our pay practices since the beginning of the financial crisis? This dissertation attempts to answer these concerns from the idiosyncratic risk perspective.

1.1.5 Research Contribution

Earlier empirical results on the executive pay and risk relationship are clearly conflicting. Moreover, prior research suffers from several problems. One of the most important problems is measuring and defining idiosyncratic risk. Most of these studies do not separate risk into systematic risk and idiosyncratic risk. There is no consensus about the best measure of firm specific risk. For example, most of the prior studies use variance of stock returns as a measure of firm risk (Eaton and Rosen, 1983; Lewellen, Loderer, and Martin 1987; Lambert and Larcker, 1987; Yermack, 1995). Only a few studies use idiosyncratic risk, which is defined as standard deviation of regression residual. However, the use estimation methods are prevalent. These estimation methods include market model to the Capital Asset Pricing Model and Fama and the French three-factor model. Another potential problem of prior research is frequency of samples to estimate risk and the sample period. More importantly, prior studies assume that idiosyncratic risk is stationary.

In addition, earlier studies use prevalent control variables in their estimation of pay-performance and firm risk relationship. Guo and Ou-Yang (2006) theoretically prove that when the agent's experience and skills are controlled, there is a negative relationship between pay-performance sensitivity and risk. This result is consistent with Palia (2001). For example, Palia (2001) finds a negative relationship between PPS and risk after controlling for managers' education, experience and age. When managerial characteristics are not included in estimation, prior studies find a positive relationship between firm risk and executive pay. For example, when Core and Guay (2002) and Shi (2003) do not include managerial characteristics such as education, experience, and age in their estimations, they find a positive relationship.

Given that measures of firm risk are so prevalent in the agency literature and that the predictions based on them have been taken almost literally, it is of great importance to examine their robustness. We cannot rely on the findings of the previous studies since these studies do not specify the estimation model correctly and do not use an appropriate and more comprehensive measure of idiosyncratic risk. Idiosyncratic risk is time-varying (Fu, 2009). Therefore, it is important to use such a study in a framework that incorporates time-varying factors on idiosyncratic risk. One way to incorporate time-varying effects on idiosyncratic risk is to use the EGARCH (p, q) estimation method.

The main contributions of this dissertation are threefold. First, this study fosters research on executive compensation by providing up-to-date information on executive compensation contracts and compensation structures by analyzing and reviewing the relevant theoretical and empirical research on executive pay. Second, this study explores a comprehensive role of idiosyncratic risk on executive pay. Third, this study will fill the gap in the previous literature by testing whether executive compensation is influenced by the idiosyncratic volatility of a firm. Earlier research is not able to define the true role of idiosyncratic risk on executive pay. Therefore, this study expects to fill this void in executive compensation research and define a true relationship between firm risk and executive pay. Since we are just emerging from one of the worst economic crises since the Great Depression, we need to address this issue on executive pay set up. It is very important that our executive pay set up structure incorporates executive risk taking behavior. This may help us avoid another major financial crisis in the future due to reckless risk-taking actions of executives.

1.1.6 Outline of the Dissertation

The remainder of the dissertation is organized as follows: Chapter 2 provides a comprehensive review of existing literature on executive pay-performance and firm risk relationship. Chapter 3 explains the sample, develops hypotheses and explains methodologies to test the hypotheses in this study. Chapter 4 reports and interprets the findings of this study. Chapter 5 summarizes this dissertation.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter consists of a review of previous studies on the factors related to executive compensation and the relationship between risk and executive compensation. This chapter reviews all available theoretical and empirical evidence on executive compensation, determinants of executive compensation and the impact of risk on executive compensation. The main purpose of this review is to explore and analyze previous research on executive compensation and risk. This review is very important for several reasons. First, this study intends to provide theoretical and empirical contributions on the existing theory of executive compensation. Therefore, an extensive review of existing studies on executive compensation is very important. Moreover, it is necessary to explore the other factors or control variables that earlier studies identify to find the precise relationship between non-systematic risk and executive compensation. These control variables serve to identify a more precise model to test the relationship between non-systematic risk and executive compensation. Finally, previous studies provide strengths and weaknesses of research design, which helps to develop a more precise and fully specified model to conduct empirical testing on the relationship between firm risk and executive compensation.

This chapter will be organized as follows: First, it will explain the theoretical framework of this study. Second, it provides an extensive review of the determinants of executive compensation. It will help this study to identify control variables. Third, literature on risk and executive compensation will be reviewed. Finally, this chapter concludes with a summary and critical review of previous literature, and explains how and why this study is important and how it contributes to executive compensation literature.

2.2 Theoretical Framework

Executive compensation has been of interest to researchers for decades. Berle and Means (1932) provide a basic theoretical base of executive research. Roberts (1956) published one of the earliest empirical studies. Agency theory, which was grounded in Berle and Means (1932) and further developed by Jensen and Meckling (1976), Fama (1980) and Fama and Jensen (1983), typically serves as the framework to examine the efficiency and efficacy of executive compensation. Incentives are put in place to mitigate problems by the separation of ownership and control. As Jensen and Murphy (1990) mention, agency theory predicts that an optimal contract will tie the agent's expected utility to the principal's wealth and, therefore, agency theory predicts that CEO compensation policies will depend on changes in shareholder wealth.

Firm managers may use their discretion to reward themselves in many ways (Shleifer and Vishny, 1997). They engage in empire building (Jensen, 1974; Williamson, 1964), fail to distribute excess cash when the firm does not have profitable investment opportunities (Jensen, 1986), entrench themselves in their positions making it difficult to oust them when they perform poorly (Shleifer and Vishny, 1989), and take excessive risk. Thus, management's actions and behavior are very important for the future of a company. It is very important to understand fundamental theories on executive pay to understand executive pay practice. Primarily there are two distinctive views to explain executive pay and agency relationship.

One of the most important and dominant approaches among financial economists in the study of executive compensation is the optimal contracting approach. According to this view, incentives to executive pay are a remedy to an agency problem. Therefore, under the optimal contracting approach, boards of directors will design incentive schemes in such a way that incentive plans may align owners' interests with that of managers resulting in shareholders' wealth maximization. However, empirical findings show mixed results.

Another important approach to studying the executive compensation and agency problem is known as the managerial power approach. According to the managerial power approach, executive compensation is viewed not only as a potential instrument for addressing the agency problem but also as part of the agency problem itself. Under this approach, it is argued that executives use their power to extract incentives. As a number of studies find, some features of pay arrangements seem to reflect managerial rent-seeking rather than the provision of efficient incentives (Blanchard, Lopez-de-Silanes and Shleifer, 1994; Yermack, 1997; and Bertrand and Mullainathan, 2001). Bebchuk and Fried (2003) and Bebchuk, and Fried and Walker (2002) further provide support in favor of the rent-extraction hypothesis. Bebchuk and Fried (2003) find that managerial power and rent extraction play an important role in executive compensation, and it has significant implications for corporate governance. However, the extent to which managerial influence can move compensation arrangements away from optimal contracting outcomes depends on the extent to which market participants include institutional investors (Bebchuk and Fried, 2003).

Tournament theory sees executives' compensation differently. Tournament mechanisms suggest the need for larger rewards to motivate those at the highest organizational levels. According to tournament theory, people strive in a winner-take-all market to become the overpaid CEO. Therefore, even if CEOs do not deserve the pay, their dynastic treatment makes everyone around them work harder. Main and Wade (1993) find results consistent with the operation of the tournament theory but fail to find support for the empirical importance of considerations of pay equity at the top of the corporation.

Given these theoretical explanations, it is very important to include factors that incorporate the essence of these theories on executive compensation study. Otherwise, empirical study will be incomplete and will not be able to provide precise relationships between executive pay and the variables of researchers' interest.

Agency theory provides a theoretical foundation on firm risk and executive pay relationships. The principal-agent model of executive pay is a key to the modern theory of the firm and corporate governance (Aggarwal and Samwrick, 1999). Two of the most widely tested results of agency theory are that there is a negative tradeoff between risk and incentives and those managerial incentives enhance firm performance (Guo and Ou-Yang, 2004). As Aggarwal and Samwrick (1999) state, in most principal-agent models the pay performance sensitivity will be decreasing in the riskiness or variance of the firm's performance. Executives in firms with more volatile stock prices will have less performance-based compensation. Therefore, the principal-agent model of agency theory is the theoretical foundation of this research.

2.3 Determinants of Executive Compensation

In any public company, the goal of shareholders is to maximize their own wealth and they seek ways that motivate the manager they appoint to work on their behalf to achieve their goal. The relationship between the shareholders and manager is known as agency relationship. An agency relationship is a contract under which one or more persons (the principal(s) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent (Jensen and Mackling, 1976). If both the principal and the agent are utility maximizers, there is a good reason to believe that the agent will not always act in the best interests of the principal (Jensen and Mackling, 1976). When there is divergence of the interests between shareholders and managers, it results in cost to the shareholders. The dollar equivalent of the reduction in welfare experienced by the principal due to this divergence is a cost of the agency relationship (Jensen and Mackling, 1976). Thus, divergence of interest between shareholders and managers cause agency cost, which is the sum of the monitoring expenditures by the principal, the bonding expenditures by the agent, and the residual loss (Jensen and Mackling, 1976). The residual loss is the dollar equivalent reduction in shareholders' welfare due to divergence of interest between principal and agent.

Most of the previous studies agree that managerial incentive is one of the instruments to mitigate the agency problem. The principal can limit divergence of the agent's interest from his interest by establishing appropriate incentives for the agent and by incurring monitoring costs designed to limit the anomalous activities of the agent (Jensen and Mackling, 1976). Watts and Zimmerman (1978) also point out that executive compensation may be viewed as an important means to reduce agency conflicts between shareholders and managers. Such compensation plan should be measureable, observable and not susceptible to manipulation; have a long-term perspective to match the perspectives of shareholders; should attempt to match the agent's risk to that of the principal; and should be tied to changes in shareholders' wealth (Copland and Weston, 1988).

CEO compensation is a function of market and political processes (Finkelstein and Hambrick, 1989). Market factors that influence executive compensation include human capital and corporate complexity. Political factors include CEO power and board vigilance, which are based on agency theory. Executive compensation also has several dimensions. One of them is the functional form of the pay package and the level of pay (Jensen and Murphy, 1990). The functional form determines the relationship between pay and performance, the composition of the pay package determines the incentive effects of compensation, and the level of pay determines the ability of the firm to hire and retain executives.

An organization attempts to align the interests of employees with the larger interest of the organization, usually defined as shareholders' interest, by providing various incentives to employees. These incentives and theories include the efficiency wage theory (Akerlof and Yellen, 1986), the temporal distribution of pay (Lazear, 1981; Hutchens, 1989), pension policies (Lazear, 1979), and the structure of managerial compensation systems (Jensen and Murphy, 1990). In agency theory the principal wants not only the agent's effort but also the right kind of effort (McMillan, 1992). Therefore, the right kind of effort on the part of the executive is necessary to align the interests of principal and agent.

In addition to the agency model, some research focuses on tournament and social comparison models. The tournament theory argues that such systems are desirable when monitoring is either unreliable or costly (Lazear and Rosen, 1981). Instead of using monitoring and supervision to enforce the implicit employment contract, the firm should rely on a self-enforcing reward structure. Thus, compensation is based on the rank in organization, and the likelihood of being rewarded depends on an individual executive's performance relative to others. Lazear and Rosen (1981) find that when workers are risk neutral, wages based on rank induce the same efficient allocation of resources as an incentive reward scheme based on individual output level. Social comparison theory is based on the belief that the compensation committee of the board of directors will compare executive compensation to their own compensation. O'Reilly, Main, and Crystal (1988) find strong support for the social comparison theory. They find strong association between executive compensation and compensation levels of outside members of the board of directors serving on the compensation committee.

Furthermore, previous studies based on cross-sectional study find several factors in determining executive pay. For example, Riahi-Belkaoui, and Pavlik (1993) find that firm size, ownership structure, and diversification strategy affect executive compensation through the mediating effects of firm performance. Therefore, as mentioned by Rajagopalan and Prescott (1990), lack of interdisciplinary research results in exclusion of relevant constructs and may obscure true relationships. Executive compensation has been one of the extensively studied areas in finance for decades. Prior research uses several variables to test the determinants of executive compensation using both domestic and foreign publicly-owned companies. In this context, this section will explore these determinants.

2.3.1 Firm Performance and Compensation

Most of the previous work on executive compensation uses firm performance as an important determinant of compensation. Primarily, performance indicators include stock returns[14], a market based measure, and return on equity and return on assets, accounting based measures[15]. Besides, some studies use economic value added, abnormal returns, shareholders' wealth, asset growth, sales growth, and profit margin to measure firm performance. In this study, we include stock returns and return on assets to control the effect of firm performance on executive compensation.

2.3.1.1 Stock Returns and Return on Assets

It is expected that executives act in the best interest of shareholders and, therefore, performance must be related to change in shareholders' wealth (Lewellen and Huntsman, 1970; Chpeland and Weeston, 1988). By linking firm performance to executive pay, we expect that firm outcomes provide incentives to managers to maximize firm performance. In other words, firm performance is reflected in executive or CEO performance. The functional dimension of executive compensation provides the definition of the relationship between pay and performance (Baker, Jensen and Murphy, 1988). Therefore, by providing incentives to managers, shareholders want to maximize their wealth.

Early studies on pay-performance relationship find very weak relationship between executive compensation and firm performance, but a very strong relationship between executive compensation and sales growth (Roberts, 1959; McGuire, Chiu and Elbing, 1962). However, those studies are criticized for methodological errors (Ciscel and Carroll, 1980). Employing a longitudinal research design, Lewellen (1969) finds statistically significant but smaller magnitude

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14 For example, several researchers including Jensen and Murphy, 1990 and Gibbons and Murphy, 1990 use stock return as firm performance variable.

15 For example, several researchers including McGuire, Chiu and Elbing (1962), Hogan and McPheters (1980), Lewellen and Huntsman (1970). Abowd (1990) use accounting ratios such as ROA/ROE. Sloan (1993) demonstrates that earnings reflect firm-specific changes in value but are less sensitive to market-wide movements in equity values. The find that the inclusion of earnings-based performance measures in executive compensation contracts helps shield executives from fluctuations in firm value that are beyond their control. Low (2009) use lag return on asset (ROA) as a proxy for profitability.

of relationship between executive pay and firm performance (both accounting and market measures). However, Masson (1971) finds a strong relationship between compensation and stock returns. Core, Holthausen, and Larcker (1999) use previous year's stock returns and return on equity as measures of firm performance and find that prior year's stock returns positively related to compensation, but they do not find any explanatory power of return on equity.

Furthermore, examining the relationship between executive compensation and change in cash components of executive pay and abnormal stock returns during the period of change, Coughlan and Schmidt (1985) and Murphy (1985) find a significant positive relationship between stock returns and changes in current cash compensation. Similarly, Baber et al. (1996) also finds a positive relationship between stock returns and changes in different components of executive pay. However, Kerr and Bettis (1987) find no significant relationship between rates of changes in the cash component of executive pay and abnormal stock returns. Different results in previous studies could be because of differences in sample size, sample period and methodologies.

Economic theories of efficient compensation suggest that compensation contracts depend on several factors such as entrepreneurial ability, managerial responsibility, firm size and past performance in addition to current performance (Murphy, 1985). Murphy (1985) argues that previous cross-sectional models have omitted important variables so they are subject to a serious omitted variables problem. Therefore, he argues that we can correctly assess the relationship between compensation and performance by analyzing time-series regressions for individual executives. Using data that focuses on individual executives over time, Murphy (1985) re-examines the relationship between firm performance and managerial pay. This analysis includes five hundred executives from seventy-three of the largest U.S. manufacturing firms over the 1964-1981 sample periods. He finds a strong positive relationship between executive compensation and corporate performance as measured by shareholder return and growth in firm sales.

Efficiency of an agency contract can be improved by incorporating performance of other firm with similar business risk (Antle and Smith, 1986). However, finding a peer with similar business risk is a problem (Foulkes, 1990). Therefore, researchers use relative performance executive compensation research. For example, Antle and Smith (1986) and Gibbons and Murphy (1990) find that a higher value weighted industry rate of return lowers the growth of CEO compensation when the rate of return on a firm's common stock is held constant. Similarly, Jensen and Murphy (1990b) find that relative performance is not an important source of managerial incentives. Using market-adjusted and industry-adjusted measures of performance, Gibbons and Murphy (1990) find a stronger relationship between executive pay and market-adjusted return than industry-adjusted return. However, using data on banks Barro and Barro (1990) find that compensation increases with industry performance. Using a Japanese firms sample, Joh (1996) also finds similar results. Moreover, using accounting data, Janakiraman, Lambert, and Larcker (1992) find that compensation increases with industry performance but decreases when they use stock return data. Aggarwal and Samwick (1999) find some evidence of relative performance evaluation in short-term compensation but they find that long-term compensation increases with industry performance.

Other studies on pay performance also find contradictory results. For example, Hall and Liebman (1998) find larger pay-performance sensitivities and document that the pay-performance sensitivity has grown since 1980 because of increasing ownership of stock and stock options. Nevertheless, they do not draw inferences about the validity of the principal-agent model based on their study results. Jensen and Murphy (1990*b*) find very small impact of performance on incentives. They find that the compensation of chief executive officers increases by only \$3.25 per \$1,000 increase in shareholder wealth. Therefore, they hypothesize that political forces work to reduce the pay-performance sensitivity from what would be consistent with the principal-agent model. Jensen and Murphy (1990) also find a statistically significant positive relationship between firm performance in the prior year and executive pay.

In conclusion, empirical evidence on the relationship between incentives and performances has been mixed. For example, Morck et al. (1988), Mc-Connell and Servaes (1990), and Lazear (2000) find a positive relationship; whereas Himmelberg et al. (1999) and Palia (2001) find little evidence that managerial incentives enhance performance. In other words, some research finds a statistically significant positive relationship between firm performance and executive compensation whereas other studies find a week relationship. Therefore, following prior studies on compensation, this dissertation will include both market and accounting measures of firm performance as control variables. Given the prior mixed results, this dissertation hypothesizes that there is a positive relationship between firm performance and executive pay.

2.3.2 Firm Characteristics and Compensation

Prior empirical research finds firm characteristics as important elements of executive pay. These characteristics include several components such as firm size[16], growth opportunities[17], cash flow shortfall, operating loss, tax rate, and dividend constraints.

2.3.2.1 Firm Size

The difficulty of monitoring management's actions increases with firm size (Jensen and Meckling, 1976). Therefore, there is a need for more incentive plans when a firm's size increases (Chourou, Abaoub, and Saadi, 2008). Prior empirical research documents a large cross-sectional correlation between the level of executive pay and firm size. Almost all of

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16 Measure of firm size identified by prior researches include book value of assets, book value of equity, market value of equity, ratio of market to book values of assets, total book to assets at the beginning of the year, fixed assets etc.

17 Market-to-book ratios often are used to measure a firm's growth opportunities relative to assets in place as shown by Myer's (1977). For example, Collins and Kothari (1989) and Smith and Watts (1992) argue that the difference between the market value and book value roughly represents the value of investment opportunities facing a firm. Similarly, Chung and Charoenwong (1991), Gaver and Gaver (1993), Holthausen and Larcker (1991), Kole (1991), Lewellen, Loderer, Martin (1987), low (2009) also use market-to-book ratios as proxies for growth or investment opportunities. Some researchers use lag of market-to-book ratio as a proxy for investment opportunity.

the prior researchers control for firm size in their empirical research on executive compensation. Thus, the relationship between firm size and executive compensation is widely recognized in compensation literature. However, empirical results are mixed. For example, Smith and Watts (1992) and Core and Guay (1999) find that the optimal level of equity incentive increases with firm size. Smith and Watts (1992) argue that larger firms require more talented managers who demand higher compensation. Chourou et al. (2008) also find that firm size measured as the logarithm of total assets is positively related to executives' pay, which is consistent with the prediction of Jensen and Meckling (1976). These results are consistent with Rialhi-Belkaoui and Pavlik (1993), Ittner et al. (2003), Miller et al. (2002), Ryan and Wiggins (2001), Boyd (1994), Finkelstein and Hambrick (1989), Coughlan and Schmidt (1985), Ciscel and Carroll (1980), McGuire et al. (1962), Patton (1961), and Roberts (1959). In a more recent study, Lambert, Lacker and Weiggelt (2006) find a statistically significant but much smaller relationship between compensation and firm size. Examining the effects of changes in firm size on changes in executive salary, Deckop (1988) and Lambert et al. (1991) find that executive compensation is not primarily driven by changes in organizational size.

Using the natural log of a firm's total assets as a proxy for size, Ryan and Wiggins (2001) argue that operations become more complex and the possibility of agency conflicts increases when managers have more assets at their disposal. They also argue that large firms receive more publicity and coverage by analysts, which in turn reduces asymmetric information. The increased possibility of agency conflicts suggests the need for more incentive alignment, but the reduction in asymmetric information suggests that large firms should be easier to monitor.

There are also theoretical rationales behind the pay and size relationship. Firms have different hierarchical levels. Firms try to maintain differentials among managers to motivate and reward them (Simon, 1997). Large firms have more heretical levels than smaller firms do.

Therefore, pay difference between small and large firms could be a result of structural differences. Simon (1957), therefore, argues that executive compensation is related to the number of hierarchical levels in the firm but not the size.

Economic theory also provides support for executive pay differences between small and large firms. It is expected that managerial productivity increases with firm size. An increase in productivity results in higher pay to executives (Roberts, 1959). Aggarwal (1981) argues that larger firms' ability to pay is closely related to firm performance. Complexity of organizational structure is another explanation of pay differences between small and large firms. For example, Aggarwal (1981) argues that size is an important determinant of executive compensation since size is a proxy for organizational complexity. According to the business complexity view, executives in complex firms require more skill, experience, expertise, and responsibility resulting in executive pay differences between small and large firms. There are also views that larger firms pay more to their executives simply because of their ability to pay. For example, Raff and Summer (1987) state that larger firm can pay higher wages because of their ability to attract and retain the best executive in labor market.

To conclude, empirical findings on executive pay and firm size are mixed. For example, Smith and Watts (1992) and Core and Guay (1999) find a positive relationship between stock option awards and firm size; Mruphy (1985) reports a negative relationship; Matsunaga (1995) and Mehran (1985) fail to find any significant relationship between stock option awards and firm size. However, with increased firm size the difficulty of monitoring management increases (Jensen and Meckling, 1976). Consequently, the need for more incentive plans also becomes more pronounced with large firms. Thus, it is very important to control for firm size in executive pay research. Therefore, we include firm size measured by firm's total assets to control for the effect of size on executive compensation. Given the prior research findings, we expect firm size to have a positive effect on executive pay.

2.3.2.2 Growth Opportunities

Firms differ from one to another in terms of their growth and investment opportunities[18]. Top management holds inside information about the value of growth opportunities (Smith and Watts, 1992) in their firm. Firms with high growth opportunities derive a larger portion of their value from future investments than from existing assets. Therefore, managers of high growth firms are more difficult to monitor since efficient management of existing assets is less important than future investment decisions (Ryan and Wiggins, 2001). Assuming information asymmetry between management and shareholders, CEO monitoring in high growth firms is not an easy task (Chourou, Abaoub, and Saadi, 2008). Thus, the presence of growth opportunities makes it more difficult to monitor managerial actions. Therefore, firms experiencing high growth opportunities should offer more stock-based compensation to their CEOs.

Empirical evidence on the effect of growth opportunities[19] on top management compensation is mixed. For example, Lewellen et al. (1987), Matsunaga (1995), and Mehran (1995) find a positive relationship between growth opportunities and the level of CEO stock-based compensation. Core at el. (1999), Hanlon et al. (2003) and Ittner et al (2003) also find empirical evidence consistent with a positive association between firm growth opportunities and equity-based compensation. Using a Canadian firm sample, Chourou, Abaoub, and Saadi (2008) also find that the presence of growth opportunities is positively related to a stock option mix, which is consistent with Bryan et al. (2000), Ryan and Wiggins (2001) and Ittner et al. (2003). In contrast, Yermack (1995) finds a negative effect of growth opportunities on CEO's equity compensation. Ryan and Wiggins (2001) predict market-to-book assets to have

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18 Prior studies are not consistent with measure of investment opportunity. For example, Smith and Watts (1992), and Bizjak, Brickley and Coles(1993) use market-to-book assets, Lewellen, Loderer, and Martin (1987) use market-to-book equity, Gaver and Gaver (1993,1995) use a factor-adjusted measure comprised of market-to-book equity, market-to-book assets, R&D intensity, and total firm return. Gaver, J. and Gaver, K., 1993. Additional evidence on the association between the investment opportunity set and corporate financing, dividend, and compensation policies. Journal of Accounting and Economics 16, pp. 125–160. Abstract | PDF (2306 K) | View Record in Scopus | Cited By in Scopus

19 Gaver and Gaver (1993) and Yermack (1995), Chourou, Abaoub, and Saadi (2008) use the market-to-book ration as a proxy for growth opportunities.

a negative effect on bonuses and a positive effect on restricted stock. Contrary to their prediction, they do not find any effect of market-to-book assets on bonuses and restricted stock.

To summarize, assuming information asymmetry between management and shareholders, monitoring in high growth firms is a difficult task. Managers are likely to hold inside information about the value of growth opportunities (Smith and Watts, 1992). Therefore, firms experiencing high growth opportunities should pay more incentives to their executives. Empirical evidence, however, is mixed. For instance, Lewellen et al. (1987), Matsunaga (1995), Mehran (1995), Bryan et al. (2000), Ryan and Wiggins (2001), Ittner et al. (2003) Chouroua et al. (2008) find a positive relationship between growth opportunities and the level of CEO stock-based compensation, whereas Yermack (1995) finds a negative relationship. Therefore, it is very important to control for growth opportunities in executive compensation research. Given the prior empirical findings, we expect growth opportunities to have a positive impact on executive compensation.

2.3.2.3 Cash Flow Shortfall

Contrary to cash-based compensation, equity-based compensation does not require current outlay of cash by the firm allowing firms to preserve liquidity. Compared to cash-based compensation, equity-based compensation exerts relatively low pressure on a company's current cash flow. Therefore, stock option compensation should be more prevalent in firms facing scarcity of cash. Empirical results show mixed results. For example, Yermack (1995), Dechew et al. (1996) and Bryan et al. (2000) support the hypothesis that firms with cash constraints are more likely to use equity-based compensation. However, Chourou, Abaoub, and Saadi (2008) fail to find any association between liquidity and level of stock option mix. Matsunaga (1995) also fails to find any association between liquidity and stock-based compensation. Given this evidence, we expect liquidity constraints to have a negative effect on salary and bonuses and a positive impact on equity-based compensation and total compensation of top executives.

2.3.2.4 Operating Loss

Operating loss is another important firm characteristic. Firms with higher net operating loss appear to award larger grants and other equity compensation to their executives to encourage them in engaging in the firm's value increasing activities. Equity compensation is one of the most important components of executives' pay. Therefore, following Core and Guay (1999), we include operating loss in our analysis. We expect operating loss to have a positive effect on executive pay.

2.3.2.5 Marginal Tax Rate

Stock options offer tax advantages to executives, since they generally do not result in taxable income until the executives exercise their stock option incentives at a later time and the resulting income is often taxed at capital gains rates, Yermack (1995). Therefore, from a tax point of view, stock option awards may be more costly than other forms of compensation that immediately reduce taxable income (Scholes and Wolfson, 1992; Yermack, 1995). There are arguments that managerial compensation incorporates tax effect. Compensation is set up in such a way that the plans reduce the combined tax liability of the corporation and its managers. The other explanation is that the plans encourage managers to maximize the value of the firm.

There is limited empirical evidence that the tax effect can explain some of the popularity of compensation plans, some of the variation in their use across firms, and the timing of changes in the provisions of the plans. Smith and Watts (1992) examine explanations for corporate financing, dividend and compensation-policy choices. They document robust empirical relationships among corporate policy decisions and various firm characteristics. They suggest contracting theories are more important in explaining cross-sectional variations in observed financial, dividend, and compensation policies than either tax-based or signaling theories. Following Clinch (1991), Yermack (1995) uses an indicator variable equal to one when firms have non-zero tax loss carry-forwards to find tax effects on compensation. He does not find any influence of tax effect on pay. Therefore, following prior research, we control the effect of corporate tax on executive pay. Given the prior research findings, we predict that tax policy does not influence managerial compensation.

2.3.2.6 Dividend Constraints

Contrary to salary and bonuses, stock options do not require current outlay of cash by the firm allowing firms to preserve liquidity. Core and Guay (1999) argue that when dividends are constrained, firms use equity compensation. They include dividend constraints in their study and find results consistent with their expectations. Therefore, following DeWald et al. (1996) and Core and Guay (1999), we use dividend constraints in our analysis, and we expect dividend constraints to have a positive impact on executive pay.

2.3.2.7 Other Characteristics

Operating characteristics of each firm differs from one to another which results in differences in executive compensation. These characteristics include industry, growth, and number of business segments. These firm characteristics also result in differences in agency problems in different firms. For example, in a complex and dynamic business environment, it is difficult to monitor executive actions; CEOs in regulated firms are paid less than CEOs in non-regulated firms (Joskow, Ross, Shepard and Meyer, 1993). Booth (1993) finds similar evidence. He finds that CEOs in non-bank firms earn more than their bank counterparts. This difference may be a result of extra monitoring in regulated firms. Therefore, intra-industry variations must be controlled while investigating the relationship between pay and performance (Rajagopalan and Prescott, 1990). Similarly, other firm operating characteristics, such as number segments, indicate business differences. Business complexity requires executives to make complex business decisions. Therefore, we must control industry effect to find a precise relationship between idiosyncratic risk and executive compensation.

2.3.3 Firm Policies and Compensation

Firm policies are important tools for the success of a firm. Effective and efficient use of these policies may result in shareholders' wealth maximization and vice-versa. Investment, financing, and dividend policies are the most important firm policies. Previous studies use these firm policy variables in executive pay-performance research. These variables include research and development expenditure (R&D) as a measure of investment policy (Coles, Daniel and Naveen, 2006), the herfindahl index and number of segments as firm focus (Berger and Ofek, 1999; and Coles, Daniel and Naveen, 2006), and leverage as debt policy (Coles, Daniel and Naveen, 2006). Similarly, Low (2009) controls for the contemporaneous values policy variables, such as research and development expenditure, net capital expenditure, leverage, and number of business segments and firm focus; and uses the herfindahl index to examine the effects of these variables on executive compensation. Coles, Daniel and Naveen (2006) examine the relationship between managerial compensation and investment policy, debt policy, and firm risk. They find a strong casual relationship between managerial pay and investment policy, debt policy, and firm risk. We classify these firm policy variables as investment, debt and dividend policies.

2.3.3.1 Investment Policy

Research and development expenditure (R&D) and capital expenditure (CAPEX) are important firm investment policy measures, and prior empirical studies find them to be important elements in executive compensation. As prior researchers note, R&D is riskier than CAPEX (Bhagat and Welch, 1995) and is harder to value due to its long horizon (Bange and DeDondt, 1998). Therefore, Ryan and Wiggins (2001) hypothesize that investment horizon and uncertainty create agency conflicts that influence the compensation structure.

Ryan and Wiggins (2002) use market-to-book value of assets as a proxy for growth opportunity and the ratio of R&D expenditures to total firm assets as investment opportunity. Empirical results on investment opportunity are mixed. Researchers find a positive relationship

(Clinch, 1991; Smith and Watts, 1992; Gaver and Gaver, 1993 and 1995; and Baber, Jankiraman, and Kang, 1996) and a negative relationship (Bizjak, Brickley, and Coles, 1993; and Yermack, 1995) between investment opportunity proxies and compensation tied to stock price performance. Bryan, Hwang, and Lilien (2000) and Ryan and Wiggins (2001) find a positive relationship between research and development expenditures and stock options and negative relationships between R&D and restricted stock awards. Baber et al. (1996) use a measure of a firm's investment activity as a ratio of the sum of acquisitions, research and development, and capital expenditures to depreciation expense. They also create an investment opportunity set using a factor of these three variables. They find evidence consistent with prior studies that there is a positive cross-sectional association between investment opportunities and the use of incentive compensation plans. Smith and Watts (1992), Gaver and Gaver (1993) and Skinner (1993) investigate how corporate policies relate with measures that proxy for investment opportunity sets. Smith and Watts (1992) predict that executive compensation varies positively with levels of investment opportunities.

Most of the prior research uses R&D, CAPEX, and market-to-book ratio as proxy for investment opportunity set20. Prior results on the association between managerial compensation and these firm policy measures show mixed results. For example, Ryan and Wiggins (2001) predict both R&D and CXPEX to have a positive effect on stock options since options tie pay to stock price but limit downside risk, and are negatively related to cash bonuses. They also predict a negative relationship between these policy measures and restricted stock compensation because managers have an incentive to underinvest when they bear residual risk. As predicted, they find a positive relationship between both investment policy measures and stock options. They find a negative effect of R&D intensity on bonuses and restricted stock as expected. Contrary to their expectations, they find no significant influence of R&D and CAPEX on bonuses and restricted stock compensation.

20 See Ryan and Wiggins (2001), Guay (1999), Coles, Daniel and Naveen (2006)

Guay (1999) uses three proxies to capture variations in firms' investment opportunities. These include the book-to-market ratio, expenditures on research and development scaled by market value of assets, and a measure of investment expenditures defined as the sum of capital expenditures plus acquisitions over the most recent three years divided by market value of assets. He argues that each of these variables has unique limitations as a measure of this underlying construct. Therefore, Guay (1999) utilizes common factor analysis to create a single variable as proxy for investment opportunity set. As predicted, he finds a positive effect of book-to-market and a negative effect of R&D and CAPEX on sensitivity of CEOs' wealth to equity risk. When he replaces these variables with investment an opportunity factor, he finds that the factor is positively correlated with the sensitivity of CEOs' wealth to equity risk.

Following prior research, in this study, we include expenditures on research and development scaled by market value of assets, a measure of investment expenditures defined as the sum of capital expenditures plus acquisitions over the most recent three years scaled by market value of assets, and the book-to-market ratio to control the impact of firm policy measures on executive pay. Following Guay (1999), we also employ common factor analysis to construct a firm policy factor that captures variations common to investment opportunity set. Given prior empirical results, we expect R&D to have a positive effect on equity-based compensation and a negative effect on cash-based compensation. We expect firm policy factors and investment expenditures to have a positive impact on executive pay. Furthermore, we also include advertising expense in our estimation and predict a negative impact on executive pay.

2.3.3.2 Debt Policy

Prior empirical studies find leverage as a measure of debt policy an important element in managerial pay. Debt helps mitigate agency conflicts between stockholders and managers (Jensen and Mackling, 1976). Use of debt also serves as a monitoring mechanism which in turn reduces managerial discretion (Easterbrook, 1984). However, debt also could generate a conflict between shareholders and bondholders. For instance, executives with equity-based incentives will lean toward investing in riskier projects. Therefore, debt policy may have two implications on compensation. First, if stock-based compensation induces risk-taking, then shareholders receive benefits over creditors. Second, debt financing serves as a monitoring mechanism and, therefore, there is no need for stock-based compensation.

Empirical studies show mixed results regarding the nature of the relationship between financial leverage and managerial compensation. John and John (1993) develop a model in which pay-performance sensitivity should decrease as leverage increases in an attempt to reduce agency costs of debt. As John and John (1993) argue, highly leveraged firms are less likely to relate incentives to firm stock price in order to lessen agency conflicts between bondholders and shareholders. Bryan et al. (2000) and Ittner et al. (2003) report a decrease in stock option-based awards when financial leverage increases. Ryan and Wiggins (2001) document a negative relationship between stock options and firm leverage. Confirming the theoretical model of John and John (1993), Ryan and Wiggins (2002) also find that leverage negatively influences the percentage of stock options in the compensation mix. Chourou, Abaoub and Saadi (2008) hypothesize that stock option awards incentive declines with the increase of financial leverage. As expected, they find that financial leverage has a negative effect on the use of stock options as a part of executive compensation packages, which is consistent with the prediction of John and John (1993), Bryan et al. (2000), and Ryan and Wiggins (2001), and the findings of Ittner et al. (2003) in a sample of new economy firms. However, Lewellen et al. (1987) report a positive association between stock option awards and financial leverage. In contrast, Matsunaga (1995), Mehran (1995) and Yermack (1995) find no relationship between stock option awards and financial leverage. Given these inconclusive empirical results, we include financial leverage as one of the important determinants of executive compensation, and we expect to find a negative impact of leverage on executive pay.

2.3.3.3 Dividend Policy

Dividend policy is another important firm policy that influences executive compensation. The payment of cash dividends is an area of potential conflict between shareholders and corporate managers (White, 1996). The reduction in internal funds may lead managers to issue stock or debt, either to continue paying dividends or to raise new capital for investment (Miller and Modigliani, 1961). Therefore, managers have incentives to avoid paying dividends primarily because dividends decrease the amount of discretionary funds available inside the firm (White, 1996). As Rozeff (1982) and Easterbrook (1984) argue, managers tend to lose autonomy if they frequently have to raise funds in the capital market and submit themselves to increased risk and monitoring. Dividends may also force managers to commit future cash flows to maintain a certain level of dividend payments, if managers expect investors to penalize dividend reductions or omissions (Healy and Palepu, 1988). From the shareholders' viewpoint, the increased risk-taking, monitoring and commitment of future cash flows caused by dividend payments are beneficial, especially when the investment opportunity set facing the firm does not offer the best possible returns (Jensen, 1986; Kallapur, 1994).

Empirical findings on the effect of dividend policy on compensation are mixed. For example, Lewellen et al. (1987) finds that cash compensation levels are positively associated with higher dividend payout ratios. Lambert et al. (1989) shows that managers tend to reduce dividend levels in response to the initial adoption of executive stock option plans. However, they recognize that the cost of reducing dividends varies across firms. Smith and Watts (1992) find dividend yield to be negatively associated with both cash compensation and the use of stock-option plans after controlling for the effects of growth opportunities and firm size. They also expect firms with more growth options to have lower dividend yields and higher compensation, and to use stock-option plans more often. As expected, they find a positive relationship between dividend yield and stock-option plans, a negative relationship between dividend yield and bonus plans, but no relationship between dividend yield and total compensation. However, when they exclude regulated firms in their estimation, they find dividend yield insignificant. Using different methods, Gaver and Gaver (1993) find that the results from the Smith and Watts study also hold at the firm level. Using real estate industry formula-based compensation, Golec (1994) provides evidence that in the real estate industry formula-based compensation is associated with higher dividend yields than discretion-based compensation contracts.

Signaling models reinforce the prediction that firms with higher dividend growth have more growth options. Dividend growth increases market expectations about a firm's future growth resulting in higher firm performance which in turn results in higher compensation. White (1996) finds that dividend provisions in compensation contracts provide an incentive for managers to reduce the monitoring costs associated with cash over-retention. They find that larger firms, especially those with slower expected growth, are more likely to link managerial rewards to dividends paid. This view suggests a positive relationship between managerial pay and dividend growth. However, another view suggests that when firms pay dividends, they have cash shortages resulting in lower cash compensation. Given these discussions, we include dividend yield in our model, and we predict that there is a negative effect of dividend growth or yield on managerial compensation.

2.3.4 Executive Characteristics and Compensation

Executive characteristics, such as age, tenure, number of years in the company, executive turnover, gender, whether the executive is hired from outside or inside, whether the executive assumes a dual role, and whether the executive is a member of the board of a directors, are commonly used characteristics in prior research on executive pay. Managerial compensation differs from one firm to another due to their own characteristics. Measuring executive human capital as educational level, field of study, and work experience in years, Aggarwal (1981) argues that CEOs are compensated for their human capital. Human capital influences firm productivity (Becker, 1964). Therefore, it is very important to control the effect of executive characteristics in compensation research.

2.3.4.1 Executive Age

Smith and Watts (1992) propose the so-called "horizon problem". According to the horizon problem hypothesis, as CEOs get closer to retirement, they are likely to reject positive NPV projects as well as valuable R&D investments because incentive plans based on accounting data will penalize current CEOs and reward only their successors for the results of such spending (see Smith and Watts, 1982; DeWald and Sloan, 1991; Murphy and Zimmerman, 1993). A CEO's age can be used as a proxy for the CEO horizon problem (Ryan and Wiggins, 2001). As Ryan and Wiggins (2001) argue, horizon conflicts are more likely for the oldest and the youngest CEOs. For example, older CEOs have the incentives to choose projects which pay off before retirement (Gibbons and Murphy, 1993); whereas younger CEOs have the incentives to choose short-term projects to build their reputations (Hirshleifer, 1993).

The horizon problem can be offset by offering more stock-based awards to older CEOs because investors capitalize expected returns. Therefore, firms use compensation plans to mitigate myopic behavior of managers (Kole, 1997). However, empirical evidence is mixed. Some studies relate age as a proxy for experience and managerial power and show a positive relationship between pay and age. For example, Lewellen et al. (1987) finds a positive and significant relationship between executive pay and executive age. However, other studies relate age as loss of efficiency and productivity and retirement-related horizon conflicts (Mermack, 1995; Bryan, Hwang and Lilien, 2000), and find a negative relationship between executive pay and age. Harvey and Shrieves (2001) find that the component of compensation that is incentive pay is lower for CEOs near or at retirement age and is decreasing in the percentage of firm stock already owned by the CEO. Ryan and Wiggins (2001) find a concave relationship between cash bonuses and age, suggesting that firms pay the youngest and oldest managers less short-term bonuses, and a negative linear relationship between options and age, which is consistent with prior empirical results. Ryan and Wiggins (2002) find that an executive's age and equity compensation are negatively related, which suggests that incentive alignment using equity-based awards is less effective with older CEOs. Thus, the authors suggest a convex relationship between a CEO's age and equity based pay. Focusing only on retirement-related horizon conflicts, Yermack (1995) and Bryan et al. (2000) find no significant relationship between the level of stock option awards and a CEO's age. Therefore, given these empirical findings and the classical assumption regarding the horizon problem, we expect executive age to have a positive impact on compensation.

2.3.4.2 Duality

Prior empirical works also document the effect of duality on executive pay. When the CEO chairs the board of directors, or assumes other dual role, he has the responsibility for both making decisions and monitoring those decisions. Therefore, a CEO's dual role impairs the ability of the board to monitor objectively his activities, which results in the potential for agency conflicts. However, empirical evidence shows mixed results. For example, Brickley et al. (1997) finds that dual-role CEOs hold substantially more stock than CEOs who are not board chairs. In contrast, Pi and Timme (1993) find a weak negative relationship between ownership and dual management structure for commercial banks. Brickley et al. (1997) finds that dual-role CEOs receive more total compensation. However, Ryan and Wiggins (2002) do not find any influence of duality on both stock option and restricted stock compensation.

In this study, we define duality differently. We create an indicator variable equal to one if an executive holds more than one title. For example, if an executive holds chairman and president positions or any other position with dual responsibilities, we define this as a dual position. We expect to find a positive impact of duality on executive pay.

2.3.4.3 Executive Director

To measure the scope for potential managerial interest within the firm, earlier studies also use several aspects of a firms' internal governance, including the CEO role as a member of the board of directors. The primary measure of the CEO's influence over the board of directors is whether an individual holds the offices of both CEO and chairperson of the board. Jensen

(1993) and others argue that the duality that arises from the combination of these titles can lead to board decisions that are biased in favor of management. When a CEO is the chairperson of the board, he/she may be able to control the board's agenda Jensen, 1993). Therefore, a CEO may influence compensation due to his power to control the board of directors. However, Boyd (1994) finds a negative relationship between CEO duality and board control. Powerful CEOs may influence the compensation committee resulting in domination of the salary negotiation process. In about 80% of U.S. firms, the CEO is also the chairperson of the board (Brickley, Coles, and Jarrell, 1997). Duality structure concentrates power in the CEO's position, potentially allowing for more management discretion. It also permits the CEO to effectively control information available to other board members and thus impede effective monitoring (Jensen, 1993).

The above discussion shows that if an executive serves as a director during the fiscal year, he has control over the board of directors. Control over the board of directors results in rent extraction by executives. Therefore, we expect the executive-director to have a positive impact on executive pay. We use *EXECDIR* reported by an executive compensation database as a proxy for executive director. *EXECDIR* is an indicator variable equal to one if an executive served as a director during the fiscal year.

2.3.4.4 Executive's Gender

Prior research also includes gender as an important determinant of executive pay. However, findings are mixed. For example, Bowlin, Renner and Rives (2003) find that there is no significant difference in male and female executives' pay. We expect to have a negative relationship between executive pay and gender. Clara et al. (2011) examines the gender pay gap in leadership positions by examining the relationship between managerial bonuses and company performance. Using a matched sample of 192 female and male executive-directors of U.K.-listed firms, they find the existence of gender pay disparities in corporate boardrooms. In line with their theoretical predictions, they find that bonuses awarded to men are significantly larger than those allocated to women. Muñoz–Bullõn (2010) examines gender pay differences using a sample of over 2,200 publicly held companies during the period 1992 to 2006. He finds gender differences in base salary have narrowed significantly in recent years; however, gender pay gaps still exist in variable pay. Given this evidence, we expect that female executives earn significantly less than their counterpart male executives.

2.3.4.5 Turnover

There exist many possible reasons for changes in top management. Changes in management could be a result of either disciplinary action from boards or a result of normal retirement or death of an executive. Empirical results show that a firm's poor performance is the single most important cause of involuntary turnover. For example, Weisbach (1988), Warner et al. (1988), Murphy and Zimmerman (1993), Parrino (1997), Rowe and Davideson (2000), Huson et al. (2001), Goyal and Park (2002), and Shen and Cannella (2002) investigate how a firm's performance affects executive turnover. These studies indicate that poor firm performance is the single most important determinant of involuntary turnover. Chakraborty et al. (2009) finds that incentives and turnover are positively related. Analyzing 508 successions, Elsaid and Davidson (2009) find that total compensation of successor CEOs increases by 69% over their predecessors, but the structure of successor compensation is heavily influenced by the predecessors' contracts. However, the changes in the predecessor's contract depend on several factors such as whether the turnover is voluntary or forced, whether the successor is an insider or outsider, the structure and power of the board, and the structure and power of the compensation committee (Elsaid and Davidson, 2009). Therefore, we are uncertain about the impact of turnover on executive pay. So, we do not make any prediction on the impact of turnover on executive pay.

Overall, the impacts of executive characteristics are important determinants of executive compensation. Therefore, it is very important to control the effects of these variables to estimate the effect of idiosyncratic risk on executive pay. Exclusion of these variables may result in omitted variable bias and the result without controlling the effect of executive characteristics will be under- or over-estimation of the effects of idiosyncratic risk on executive pay. Therefore, we must control the effect of executives' characteristics such as age, gender, duality and turnover on executive compensation research.

2.3.5 Corporate Governance and Compensation

Corporate governance is very important in executive pay analysis. Lack of effective corporate governance may create a level playing field for executives. In the absence of better governance, a board of directors may not be able to work effectively to set up optimal compensation contracts. Indeed, optimal compensation contracts could result either from effective arm's length bargaining between the board and the executives or from market constraints that induce the parties to adopt such contracts even in the absence of arm's length bargaining. However, neither of these forces can be expected to prevent significant departures from arm's length outcomes.

The academic literature on corporate governance examines the effectiveness of internal governance on executive pay. There is mounting evidence of the failure of certain governance structures to motivate managers to rent seeking activities. Prior research on executive pay and corporate governance find a strong positive relationship between weak governance structure and executive pay. For example, Core, Holthausen, and Larcker (1999) find that firms with weaker governance structures have greater agency problems; CEOs at firms with greater agency problems receive greater compensation; and firms with greater agency problems perform worse. Bebchuk et al. (2002) finds that managers of firms with weak governance structure will extract economic rents in the form of additional options.

A number of recent studies confirm the importance of corporate governance on corporate control. They find that firms with fewer anti-takeover provisions or weaker shareholder rights have lower value. These studies measure the level of shareholder rights in a number of ways. Gompers, Ishii, and Metrick (2003) construct a governance index (GINDEX) using all twenty-four anti-takeover provisions collected by IRRC[21]. Bebchuk, Cohen and Ferrell (2004) choose six out of the twenty-four anti-takeover provisions to form an entrenchment index (EINDEX)[22].

In an empirical study, Core, Holthausen, and Larcker (1999) show clear evidence on the importance of corporate governance on executive pay. They find that both board of director characteristics and ownership structure have a substantive cross-sectional association with the level of CEO compensation even after controlling for standard economic determinants of the level of CEO compensation, namely a firm's demand for a high-quality CEO, contemporaneous firm performance, and firm risk. More specifically, with respect to board of director variables, Core, Holthausen, and Larcker (1999) find that CEO compensation is higher when the CEO is also the board chair, the board is larger, a greater percentage of the board is outside directors appointed by the CEO (gray directors), and outside directors are older and serve on more than three other boards.

Prior research also uses monitoring mechanism as an important tool in executive pay. It implies that poor monitoring mechanism results in higher agency problems resulting higher managerial pay. Prior research mainly uses the total percentage ownership by five percent block holders (excluding the CEO), the percentage of institutional ownership, and the fraction of outsiders on the board of directors (Ryan and Wiggins, 2001). As Mehran (1995) argues,

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21 GIM index is a corporate governance index developed by Gompers, Ishii, and Metrick (2003) based on reports compiled by the Investor Responsibility Research Center (IRRC). This index is an inverse measure of shareholders rights. Following Gompers, Ishii, and Metrick (2003) several academic researches use GIM index as a measure of the quality of firms' governance provisions. For example, Harford, Mansi, and Maxwell (2008), Cremers, Nair, and Wei (2007), Dittmar and Mahrt-Smith (2007), Amit and Villalonga (2006), John and Litov (2006), Perez-Gonzalez (2006), Klock, Mansi, and Maxwell (2005), and Yermack (2004).

22 Bebchuk, Cohen, Ferrell (2004) introduce new measure of governance, an entrenchment index (E Index). They hypothesize that not all of the IRCC 24 provisions have same influence on firm value. They develop list of important corporate governance provisions based on their analysis of the IRRC provisions. Finally they came up to the conclusion that staggered boards, limits to shareholder amendments of the bylaws, supermajority requirements for mergers, and supermajority requirements for charter amendments, poison pills and golden parachute arrangements. Using these six provisions of IRCC, they assign a score, from 0 to 6, based on the number of these provisions for each company in their database on the given year or month to create EINDEX.

outsider-dominated boards are aligned with shareholders and structure compensation contracts to include more equity-based awards and vice-versa.

Empirical findings on external monitoring and compensation are mixed. For example, Mehran (1995) finds a negative relationship between equity-based awards and block holder ownership consistent with a monitoring hypothesis, and a positive relationship between outside directors and stock-based pay consistent with this board alignment premise. With respect to ownership variables, Core, Holthausen, and Larcker (1999) find that CEO compensation is lower when CEO ownership increases, external block holders own at least five percent of firm equity, and the existence of a non-CEO internal board member who owns at least five percent equity interest in the firm. Harvey and Shrieves (2001) find that the presence of outside directors and block holders facilitates the use of incentive compensation. However, Kole (1997) finds little relationship between board composition and the structure of compensation contracts.

Another constituent of monitoring mechanism is institutional ownership. Institutional ownership refers to a large institutional stake in a firm. Institutional owners have more incentives in participating in control and monitoring activities which benefit shareholders. Large institutional investors appoint their nominees to the board. These directors are expected to act in the best interest of shareholders since it is also their best interest. They vote against managerial actions that reduce shareholders' wealth (Rarrell, and Poulson, 1987, and Brickley, Lease and Smith, 1988). Thus, institutional investors play an active role in corporate governance. They help reduce perverse behaviors, such as unduly rewarding themselves, firm's value destroying merger and acquisition activities, etc.. of corporate managers. Thus, institutional investors help increase CEOs accountability (Mangel and Singha, 1993). Thus, there exists a negative relationship between institutional ownership and the level of executive compensation (Riahi-Belkaoui and Ravlik, 1993).

The boards of directors are another important aspect of executive compensation study. Prior evidence on this issue is also mixed. Empirical literature suggests that boards of directors are ineffective in establishing optimal pay structure in public firms for several reasons. First, boards of directors are ineffective because board culture discourages conflicts, and the CEO determines the agenda and information given the board (Jensen, 1993). Second, boards of directors are ineffective in setting appropriate levels of compensation because outside directors are essentially hired by the CEO, the CEO can remove them (Crystal, 1991), and their pay and benefits depend on the CEO's discretion. Finally, usually boards depend on the compensation consultant hired by the CEO, which may lead to optimal compensation contracts for the CEO but not for the firms.

Prior empirical studies on the relationship between top executive compensation and board composition also find mixed results. For example, Lambert, Larcker, Weigelt (1993) and Boyd (1994) find a positive relationship between CEO compensation and the percentage of the board composed of outside directors. However, Finkelstein and Hambrick (1989) find that compensation is unrelated to the percentage of outside directors on the board. In addition, prior literature also documents higher compensation at firms with interlocked outside directors (Hallock, 1997) and at firms with a greater portion of the board members appointed by the CEO (Lambert, Larcker and Weigelt, 1993).

Low stock ownership may indicate that managerial interests are not optimally aligned with those of shareholders. With respect to ownership variables, Core, Holthausen, and Larcker (1999) find that CEO compensation is lower when a CEO's ownership increases, external block holders own at least five percent firm equity, and the existence of a non-CEO internal board member who owns at least five percent equity interest in the firm. However, they do not document any relationship between the percentage ownership per outside director and CEO compensation. Core and Guay (1999) and Bryan et al. (2000) find that when a CEO's stock option ownership is low, the firm tends to award managers with more option or stock grants. Overall, this evidence suggests that firms with weaker governance structures have greater agency problems, CEOs at firms with greater agency problems receive greater compensation; and firms with greater agency problems perform worse.

Board size and board composition may be used to measure directors' monitoring effectiveness. Large boards and boards dominated by insiders may be less willing to openly criticize the opinions of the CEO (Mace, 1986; Weisbach, 1988; Lipton and Lorsch, 1992) and Yermack, 1996). Jensen (1993) and Yermack (1996) argue that small boards are more effective in monitoring a CEO's actions than larger boards. Therefore, these findings suggest that small boards enhance monitoring.

The board of directors is a powerful body in any firm. It can protect shareholders' interests (Pearce and Zahra, 1991). The number of independent directors in a board can be used as proxy for board control and institutional ownership as proxy for monitoring. If executives have influence over the board, they are more likely to influence their pay. However, as the number of independent board members increases, executive influence on board decisions decreases. Therefore, we can expect a negative relationship between board control and CEO compensation (Boyd, 1994).

Managerial ownership is another aspect of executive pay. As Jensen and Meckling (1976) show, when managerial ownership decreases, it gives them incentives to use more pecuniary benefits. Higher stock ownership helps to align managers' interest with that of shareholders. As a CEO owns more stock, his interest becomes more aligned with shareholders, and there is less need for incentive compensation (Ryan and Wiggins, 2001). Using the percentage of a firm's shares held by the chief executive to measure CEO stock ownership, Ryan and Wiggins (2001) find a negative relationship between both types of equity awards and the CEO's stock ownership. The negative relationships with CEO stock ownership suggest that the incentives of managers who own large amounts of stock are already aligned with shareholders and that these managers require less alignment via incentive compensation.

Overall, the impact of board and ownership structure, monitoring mechanism including other governance variables, on executive pay is unclear given the mixed nature of the empirical results. However, it is very important to control the effect of these variables to estimate the effect of idiosyncratic risk. Exclusion of these variables may result in omitted variable bias and the result without controlling the effect of governance mechanism will result in under- or over-estimation of the effects of idiosyncratic risk on executive pay. We use GINDEX and EINDEX as measures of governance and expect to find a positive relationship between executive pay and governance.

2.3.6 Firm Risk and Compensation

Compensation literature provides two opposing explanations for risk and compensation relationship. As a firm's cash flow becomes more volatile, it becomes harder to monitor management's activities, increasing the need for incentive alignment (Demsetz and Lehn, 1985). For example, if a manager faces a downside risk, he has incentive to avoid risky projects. Thus, stock option incentives provide managers with incentives but limit downside risk. Therefore, this view suggests that stock option incentives will be positively related to risk and negatively related to restricted stock. Demsetz and Lehn (1985) suggest that the amount of noise in firm's operating environment is expected to increase the cost of direct monitoring, which in turn increases the relative benefits of using option incentives. In contrast, the efficient contracting view suggests that pay sensitivity should be negatively related to the volatility of performance measures (Holmstrom and Milgrom, 1987). Therefore, this view suggests a negative relationship between pay and volatility.

Excessive risk-taking behavior may not be in the interest of shareholders. However, shareholders may not know executive policy decisions until such decisions have an impact on firm output. Jensen and Meckling (1976) demonstrate that when managers' ownership is reduced in a firm, an agency problem is created. To reduce agency conflicts with managers, shareholders are expected to tie managers' wealth to firm, or stock price, performance.

Following Jensen and Meckling (1976), Haugen and Senbet (1981) and Smith and Stulz (1985) find convexity in the relationship between stock price and managers' compensation. Firms must encourage managers to make optimal investment and financial decisions. Smith and Stulz (1985) show risk aversion can cause managers to pass up risk-increasing positive net present value projects when managers' wealth is dependent upon firm performance,.

There is abundant research that examines the effect of risk on executive pay. However, quite a few studies directly examine the relationship between idiosyncratic risk and executive compensation. Prior studies examine executive pay and firm risk from two different perspectives. One group of research mainly examines the effect of firm risk on executive pay, while the other group of literature examines how executive compensation causes risk-taking behavior.

Results of the previous research on effects of firm risk on executive pay are inconclusive. For example, using the variance of the annual return of a firm's common stock, Eaton and Rosen (1983) find a negative relationship between firm risk and executives' salary and bonus compensation. However, they find a positive effect of firm risk on deferred compensation and the option component of an executive's total pay. Lewellen, Loderer, and Martin (1987) examine whether design of the corporate executive pay package reflects an attempt to reduce agency costs between shareholders and managers. Using variance of monthly stock returns, Lewellen, Loderer, and Martin (1987) find a negative effect of firm risk on ratio of after-tax salary and current bonuses to after-tax total compensation. They find a positive effect of firm risk on the ratio of after-tax stock-related compensation to after-tax total compensation.

Guay (1999) studies the sensitivity of CEO wealth to equity risk. He quantifies the impacts of equity risk, or stock return volatility, on the value of stock options and common stock held by corporate CEOs. This study provides evidence on cross-sectional determinants of convexity in executives' incentive schemes. Guay (1999) regresses the sensitivity of CEO's wealth to equity risk to explore the relationship between convexity and investment opportunity set. He uses the sensitivity of CEOs' options portfolios to equity risk, and the combined sensitivity of stock options and common stockholdings to equity risk. Guay (1999) also regresses contemporaneous stock return volatility on the sensitivity of CEOs' wealth to equity risk to explore the relationship between equity risk and the convexity of payoffs to managers. He finds that firms' stock-return volatility is positively related to the sensitivity of CEOs' wealth to equity. Using data in a sample of 378 CEOs, Guay (1999) shows that standard deviation of returns is associated contemporaneously with Vega. Moreover, Guay (1999) finds a positive effect of idiosyncratic risk, measured by residual variance from a market model, on stock and option incentives and stock only. He finds a negative effect of firm risk on annual grants of equity incentives. Guay (1999) concludes that a firm's risk has a positive effect on executive pay. He argues that overall evidence is consistent with firms effectively using grants of equity incentives, which is consistent with the economic theory of optimal contracting. In his most recent work, Guay (2002) finds a positive relationship between firm risk and executive pay.

Furthermore, Prendergast (2000, 2002) finds that there is a positive tradeoff between risk and executive pay. He argues that risk environment plays an important role in executive pay set up. In order to induce appropriate incentives for monitoring and effort, the firm then chooses higher pay-for-performance in cases where the environment is riskier. In the most recent work, using CDF of variance of dollar return as a measure of firm risk, Dee, Lulseged and Nowlin (2005) find that pay–performance sensitivity is positively related to risk in internet firms after controlling for size, which is consistent with the theoretical predictions in Prendergast (2000, 2002).

Most of the literature on executive compensation relies on the intuition of the principal-agent model. The key prediction of the principal-agent model is that the executive's pay performance sensitivity is decreasing in variance to the firm's performance (Aggarwal and Samwick, 1999). They argue that the pay-performance sensitivity decreases in the riskiness or variance of the firm's performance in most principal-agent models. They demonstrate a strong empirical confirmation of this prediction using a comprehensive sample of executives' pay at large corporations. Using a large sample of top executives at 1,500 of the largest publicly traded corporations in the United States, Aggarwal and Samwick (1999) find that the variance of stock return is an important variable in the pay-performance relationship. In their study, the pay-performance sensitivities of both CEOs and other executives are decreasing in variance to their firms' stock returns for a variety of measures of compensation. Aggarwal and Samwick (1999) find strong evidence that executives in firms with more volatile stock prices will have less performance-based compensation. These findings strongly support the principal-agent model. In other words, the results of the Aggarwal and Samwick (1999) study strongly support the hypothesis that there is a negative relationship between executive pay and firm performance. Aggarwal and Samwick (1999a) examine compensation contracts for managers in imperfectly competitive product markets. Using standard deviation of firm return as a measure of firm risk, they find that compensation is negatively related to firm risk. This result further supports their original findings. In their reply to Core and Guay (2002), they comment on a positive relationship between firm risk and executive pay-performance, Aggarwal and Samwick (2002) conduct further tests and find results consistent with their original findings.

Mishra, McConaughy and Gobeli (2000) support the findings of Aggarwal and Samwick (1999). Using Altman's Z statistic as firm's business risk and the standard deviation of its stock returns as a measure of overall firm specific risk, they find negative trade-offs between incentives and risk. They argue that the firm risk introduced by incentive pay packages ultimately limits the benefits for risk-averse CEOs. They further argue that the expectation that the volatility of stock returns and bankruptcy risk moderate the relationship between the pay-performance sensitivity.

Jin (2002) examines the relationship between chief executive officers' incentive levels and their firms' risk characteristics. Assuming both shareholders and CEOs to be risk-averse, Jin (2002) shows theoretically that optimal incentive levels decrease with a firm's nonsystematic risk whether or not CEOs can trade the market portfolio. Unlike other studies, Jin (2002) decomposes risk into systematic and non-systematic components. She finds a negative relationship between incentive levels and non-systematic risk while controlling for systematic risk. However, she does not find significant relationship between systematic risk and incentive levels while controlling for non-systematic risk. These results are consistent with Aggarwal and Samwick (1999).

Dee, Lulseged and Nowlin (2005) examine the relationship between CEO compensation and risk. Using data from a sample of Internet firms for 1997 through 1999, they find that pay-performance sensitivity declines with increases in variance of dollar return, which is consistent with Aggarwal and Samwick (1999). However, after controlling for size, they find a positive relationship between risk and pay-performance sensitivity, which is consistent with the theoretical predictions of Prendergast (2002, 2000). Overall, findings by Dee, Lulseged and Nowlin (2005) suggest that executive pay set up practices in Internet firms take into account a firm's risk profile when designing CEO compensation contracts.

Another group of empirical studies finds no relationship between executive pay and firm risk. For example, Garen (1994), Yermack (1995), Bushman et al. (1996), Bushman, Indjejikian, Smith (1996), Ittner et al. (1997), Conyon and Murphy, and Oyer and Shaefer (2001) find no relationship between firm risk and executive pay.

Garen (1994) argues that the empirical literature on executive compensation generally fails to specify a model of executive pay. He analyzes a simple principal-agent model to determine how well it explains variations in CEO incentive pay and salaries. Many of his findings are consistent with the basic intuition of principal-agent models that compensation is structured to trade off incentives with insurance. However, statistical significance for some of the effects is weak, although the magnitudes are large. He concludes that principal-agent considerations have an important effect on executive compensation and many issues in the determination of CEO pay are unresolved[23]. He uses standard error of residuals from a market model as proxy for firm risk. He also uses interaction of firm risk with total book value of a firm's assets to test the effects of firm risk on executive pay.

Yermack (1995) analyzes stock option awards to CEOs of 792 U.S. public corporations between 1984 and 1991. Using a Black-Sholes approach, he tests whether stock options' performance incentives have significant associations with explanatory variables related to agency cost reduction. Furthermore, he tests whether corporate liquidity, tax status, or earnings management can explain the mix of compensation between stock options and cash pay. They find that few agency or financial contracting theories have explanatory power for patterns of CEO stock option awards. He uses the ratio of variance of annual changes in ROE to variance of annual stock return as a measure of monitoring difficulty to test the relationship between firm noise and executive compensation. However, he finds limited evidence that firms provide greater incentives from stock options when accounting earnings contain a large amount of noise relative to stock returns.

Bushman, Indjejikian and Smith (1996) investigate the use of individual performance evaluation in CEOs' annual incentive plans. They use the variance of stock returns as a measure of the noise in stock price relative to the CEO's actions. They also use beta and variance of residual from market model as alternative measures of noise. They find no relationship between firm risk and individual performance measured as IP/Bonus, IP/Salary, and IP/Long-Term. When they use residual variance as a measure of firm risk, they do not find different results.

Conyon and Murphy (2000) examine CEO pay using both U.S. and UK data. They do not find any relationship between firm risk measured as variance of stock return and executive pay measured as salary, bonuses and total pay. Similar results hold when they use equity-

23 See Garen (1994). He presets findings of previous research in a table. It shows that impact of firm risk seems to be a puzzle since there no conclusion on its effect on executive pay set up.

based compensation as the dependent variable in their OLS regression. They find that variance of shareholders' returns do not explain CEO stock-based compensation.

Some prior empirical studies also find a curve-linear relationship between firm risk and executive pay. These studies argue that compensation structure drives executives' risk-taking behavior. For example, Miller, Wiseman, and Gomez-Mejia (2002) examine the effects of non-systematic and systematic firm risk on CEO compensation risk bearing and total pay. They use total compensation as a dependent variable and use four measures of firm risk: systematic market risk (beta), non-systematic market risk (sigma), systematic income risk, and non-systematic income risk. Miller, Wiseman, and Gomez-Mejia (2002) use five years of monthly stock prices and Treasury Bill data to estimate both systematic and non-systematic market risk. They regress firm's quarterly ROA on the quarterly average ROA of all S&P 500 firms to estimate systematic and non-systematic income risk. In these estimates, they use the CAPM. They find a curve-linear relationship between non-systematic firm risk and pay mix. In other words, CEO compensation is highest when there is moderate non-systematic risk. This finding challenges previous findings that the amount of pay is linearly related to firm risk. However, Wiseman, and Gomez-Mejia (2002) find a positive relationship between systematic market risk and total compensation indicating that firms pay more for bearing systematic market risk. This positive relationship suggests that CEO total compensation increases with systematic market risk because of the negative effects that poor performance outcomes have on employment security, reputation, and future earnings (Walsh and Seeward, 1990).

To summarize, agency theory predicts that there is a trade-off between risk and incentives. When risk rises, the sensitivity of compensation to performance should fall (Holmstrom and Milgrom, 1987). When executives are not diversified, the contingence of compensation on firm performance transfers risk from well-diversified shareholders to executives. Therefore, in high-risk firms, contingent compensation could cause a decrease in shareholders' value (Dee et al., 2005). Empirical results on risk and compensation relationships are inconclusive. For instance, earlier empirical results on managerial pay and risk show no relationship (Garen, 1994; Yermack, 1995; Bushman, Indjejikian, and Smith, 1996; Ittner et al,1997; Conyon and Murphy, 1999); a positive relationship (Eaton and Rosen, 1983; Lewellen, Loderer, and Martin, 1987; Core and Guay, 1999a,1999b,2002; and Prendergast,2000,2002); and a negative relationship (Lambert and Larcker, 1987; Aggarwal and Samwick, 1999, 2002; Mishra, McConaughy and Gobeli, 2000; and Jin, 2002, and Dee et al,2005). Moreover, Miller, Wiseman, and Gomez-Mejia (2002) find a curve-linear relationship between executive pay and firm risk. Some of the more recent studies, for example, Coles, Daniel, and Naveen (2006) and Low (2009) argue that executive compensation structure drives executive's risk taking behavior. However, Houston and James (1995) examine whether executive compensation promotes risk taking in the banking sector and find that compensation policies do not promote risk taking in the banking sector. Thus, to date, the relationship between compensation and risk is a puzzle. Therefore, this study attempts to solve this puzzle on the executive pay firm risk relationship by using a precise measure of idiosyncratic risk.

Table 2.1 summarizes the main findings of prior research on the risk and executive pay relationship. These studies suffer from several problems, including measuring idiosyncratic risk correctly, defining compensation variables, model specification, and sample periods. Explaining the impact of idiosyncratic risk on executive pay has been considered one of the most difficult issues. Although other studies have documented evidence in related areas, they differ in the variables selected for empirical constructs as well as in their underlying models. Despite the number of published theoretical and empirical studies, we have yet to understand completely the impact of idiosyncratic risk on executive pay. Thus, based on findings of prior research, we may not draw a true conclusion on the relationship between idiosyncratic risk and executive pay. Therefore, this dissertation provides the most comprehensive empirical test on the idiosyncratic risk and executive pay relationship.

Given the prior empirical findings, it is very hard to predict the exact relationship between idiosyncratic risk and executive compensation. Following Prendergast (2000, 2002), we believe that an increased uncertainty in the business environment also increases the responsibilities of executives. Therefore, uncertain environments result in delegation of responsibilities which in turn generates incentive based compensation. Therefore, we expect to find a positive relationship between executives' compensation and idiosyncratic risk.

Table 2.1 The Trade-off between Risk and Executive Compensation

SN	Authors	Sample Period	Measure of Compensation	Measure of risk	Firm/Sample size	Results
1	Eaton and Rosen (1983)	1970-73	Cash compensation, pensions, deferred compensation, and stock options	Volatility stock of returns	22/108	Cash: negative Pension: negative Deferred pay: positive Stock options: positive
2	Lewellen, Loderer and Martin (1987)	1964-73	Ratio of after tax cash pay to after tax total pay Ratio of after tax stock related pay to after tax total pay	Volatility stock of returns	49/2383	Cash: negative Stock-based : positive
3	Lambert and Larcker (1987)	1970-84	Cash compensation	Volatility stock of returns	370/370	Negative
4	Garen (1994)	1979-88	Pay-performance sensitivity Stock and stock options Pay related incentives Cash compensation	Volatility stock of returns	415/415	No relation
5	Yermack (1995)	1984-91	Pay-performance sensitivity of stock option awards Ratio of stock option pay to cash compensation	Volatility stock of returns / Variance of ROE	792/5955	No relation
6	Bushman, Indjejikian, Smith (1996)	1990-95	Ratio of individual performance to salary Ratio of individual performance to bonus Ratio of value of long-term plan to salary Ratio of individual performance to long-term	Volatility stock of returns	396/1476	No relation
7	Ittner, Larcker and Rajan (1997)	1993-94	Ratio of target bonus to salary plus target bonus	Correlation of financial and accounting returns	317/317	No relation

Table 2.1 - Continued

8	Aggarwal and Samwick (1999)	1993-96	Total compensation	CDF of volatility of returns	1275/16419	Negative
9	Aggarwal and Samwick (1999a)	1995	Total compensation Short term compensation Long term compensation	Standard deviation of returns	1500/7824	Negative
10	Guay (1999)	1993	Sensitivity of CEOs' wealth to equity risk Sensitivity of CEOs' wealth to stock price	Volatility of returns	- / 278	Positive
11	Core and Guay (1999)	1992-97	CEO equity incentive	Volatility of returns	- / 7121	Positive
12	Conyon and Murphy (2000)	1997	Cash compensation Total compensation Stock-based performance sensitivity	Volatility of returns	510 UK and 1666 US CEOs	Cash pay: no relation Total pay : positive Stock-based performance sensitivity: OLS regression: no relation Median regression: positive
13	Prendergast (2000, 2002)			Idiosyncratic risk		Theoretically explain that incentives and risk are positively related.
14	Jin (2002)	1992-98	Pay performance sensitivity	Idiosyncratic risk	-/8177	Negative
15	Dee, Lulseged and Nowlin (2005)	1997-99	Total compensation	CDF of variance of returns	46 internet firms/104	Negative

CHAPTER 3

SAMPLE, HYPOTHESIS DEVELOPMENT AND METHODOLOGY

3.1 Introduction

This chapter will discuss the sample sources and sample selection, measures of executive pay, measure of idiosyncratic risk and its estimation procedure, and a description of other control variables. This chapter also develops our main hypothesis to test the effects of idiosyncratic volatility on executive pay. In addition, this chapter will develop methodologies to test our research hypothesis.

3.2. Data Sources and Measurement of Variables

3.2.1 Data Sources

The main objective of this dissertation is to examine the effects of idiosyncratic risk on executive compensation while controlling for other variables. Therefore, we need risk, firm performance, firm characteristics, firm policy, executive characteristics, bond rating information, governance, and political variables to test our hypothesis. We drew archival data from various sources to construct a sample. Specifically, we collect executive compensation information from Standard and Poor's ExecuComp database. It provides detailed information on the compensation of the top five executives of S&P's 1500 firms since 1992. We focus on both CEO and non-CEO executives in our study. We merge Execump with the COMPUSTAT Industrial Annual Database.

Stock price information is obtained from the Center for Research in Security Prices monthly stock files, and monthly factor information is obtained from Kenneth French's website. We use these stock prices and factor information to estimate idiosyncratic volatility. Bond rating information is extracted from Standard and Poor's ExecuComp database. The measures of governance are extracted from Investor Responsibility Research Center (IRRC), and Professor Lucian Bebchuk's website[24]. We merge all the information from various sources with COMPUSTAT and CRSP data. Our final sample contains 73,695 firm-year observations based on 2,354 unique firms.

3.2.2 Measuring Incentives

Executive pay structure is not as simple as it was in the 1970s. Therefore, only cash compensation is unlikely to represent a reliable proxy for total executive pay (Gray and Cannella, 1993). A typical executive pay package is comprised of base salary, bonuses, stock option awards, restricted stock grants, deferred compensation, retirement benefits, other long-term incentive plans, and other annual compensation.

The empirical literature on executive compensation uses a wide range of specifications of executive pay to measure the relationship between pay and risk. In this study, we categorize salary and bonuses as cash compensation *(CASH_COMP)*; stock option awards and restricted stock grants as equity-based compensation *(EQUITY_COMP)*; all other compensations, including deferred compensation, retirement benefits, other long-term incentive plans, and other annual pay, as other compensation *(OTHER_COMP)*; and the sum of all the above mentioned components as total compensation *(TOTAL_COMP)*.

3.2.3 Measuring Variable of Interest: Idiosyncratic Risk

In this analysis, we use idiosyncratic risk as a proxy for firm risk. In order to examine the relationship between firm risk and executive pay, the theoretically correct variable should be the idiosyncratic volatilities in the same period that executive pay is measured. Since idiosyncratic volatilities are time varying (Fu, 2009), one period lag of idiosyncratic volatility may not be an appropriate proxy for expected idiosyncratic volatility of another period.

24 E-Index date is based on Bebchuk, Cohen, and Ferrell, " What Matters in Corporate Finance?", The Review of Financial Studies, Vol. 22 (2), February 2009, pp. 783-827. This data is available at < http://www.law.harvard.edu/faculty/bebchuk/data.shtml >. We thank Professor Bebchuk for making these data available.

Most of the prior research estimates idiosyncratic risk using either the market model or the CAPM or Fama-French three factor model. Thus, researchers assume that time-series idiosyncratic volatility can be approximated by a random walk process. However, French, Schwert and Stambaugh (1987) and Bollerslev, Engle and Nelson (1994) find that stock index returns have time-varying volatility. Fu (2009) conducts a test to find whether or not idiosyncratic volatility follows a random walk process. She finds that idiosyncratic volatility does not follow a random walk process.

Idiosyncratic risk estimated using the above-mentioned models may not be the correct measure since the estimated idiosyncratic volatility does not capture the time-varying component of idiosyncratic risk. Therefore, we need a better model to capture the time-varying property of idiosyncratic risk. Engle (1982) proposes the autoregressive conditional heteroskedasticity (ARCH) model to represent a series with changing volatility. It proves to be an effective tool in modeling time-series behavior of many economic variables, especially financial market data (Fu, 2009). Bollerslev (1986) extends the ARCH model to the GARCH (generalized autoregressive conditional heteroskedasticity) model. The GARCH model provides a more flexible framework to capture the dynamic structure of conditional volatilities. Furthermore, Nelson (1991) proposes an EGARCH model to catch the asymmetric property of volatility. Nelson's EGARCH (exponential generalized autoregressive conditional heteroskedasticity) specification does a better job of capturing the asymmetry of conditional volatilities and it does not need to restrict parameter values to avoid negative variances as other ARCH and GARCH models do (Fu, 2009). Therefore, following Fu (2009), Brockman and Schutte (2007), Spiegael and Wang (2006), and Eiling (2006), we employ the EGARCH model to estimate idiosyncratic volatilities to capture the time-varying property of idiosyncratic risk. We use the following functional form to estimate idiosyncratic volatilities by the EGARCH (p, q) model, where $1 \leq p \leq$, $1 \leq q \leq 3$:

$$R_{it} - r_t = \alpha_{it} + b_i(R_{it} - r_t) + s_i SMB_t + h_i HML_t + \epsilon_{it}, \qquad where\ \epsilon_{it} \sim \mathrm{N}(0, \sigma_{it}^2), \tag{1}$$

$$ln\sigma_{it}^2 = \alpha_i + \sum_{l=1}^{p} b_{i,1}\, ln\sigma_{i,t-1}^2 + \sum_{k=1}^{q} c_{i,k} \left\{\theta\left(\frac{\epsilon_{i,t-k}}{\epsilon_{i,t-k}}\right) + \gamma\left[\left|\frac{\epsilon_{i,t-k}}{\epsilon_{i,t-k}}\right| - (2/\pi)^{1/2}\right]\right. . \tag{2}$$

Based on the above methodology, we estimate several EGARCH models. We require firms to have at least 36 monthly returns to be eligible for estimation. Based on the lowest Akaike Information Criteria (AIC), we choose the EGARCH (1, 1) model to estimate idiosyncratic volatility.

3.2.4 Control Variables

We choose control variables based on previous compensation literature. Prior research on executive compensation uses firm performance, firm characteristics, firm policy, executive characteristics, bond rating, governance, and other risk measures. In addition to these variables, we also include a political variable because we believe that the party in control of the government also influences executive compensation thorough several policy measures. Moreover, we also include other measures of risk, such as systematic risk *(SYS_RISK)* and bankruptcy risk *(ZSCORE_DUM)* in our estimation. Although it is very difficult to eliminate potential for omitted variables bias, we very carefully include variables suggested by prior research as the determinants of executive pay and the inclusion of these variables in our study is consistent with economic theory and the findings of prior research.

Firm performances include both market and accounting performance measures. In this study, we include annual stock returns *(STOCK_RET)* and return on assets *(ROA)* to control the effects of firm performance on execute pay. Other important determinants of executive pay are firm characteristics. Therefore, we include total assets as a measure of firm size *(SIZE)*, the square of firm size *(SIZE2)*, growth opportunities *(GROWTH_OPPORT)*, cash flow shortfall *(CASH_SHORT)*, net operating loss *(OPERAT_LOSS)*, interest coverage *(INT_COVERAGE)*, marginal tax rates *(TAX_RATE)*, and dividend constraints *(DIV_CONS)* to control the impact of firm characteristics on executive pay. To control the effect of firm policy variables, we include advertising expenditure *(XAD)*, research and development expenditure *(XRD)*, investment expenditure *(INVEST_EXP)*, financial leverage *(LIVERAGE),* firm policy factor *(FP_FACTOR)*, and dividend yield *(DIV_YIELD)*. Moreover, executive characteristics are important determinants of executive pay. To control the impact of these characteristics, we include executive's age *(AGE)*, age squared *(AGE2)*, dual responsibility *(DUALITY)*, executive director *(EXECDIR)*, gender *(GENDER),* and turnover *(TURNOVER)*. Furthermore, we include governance *(GINDEX)* or entrenchment index *(EINDEX)* to control the impact of corporate governance on executive pay. Besides, we include indicator variables for firms with S&P ratings *(RATE_DUM)* as bond rating characteristics. Finally, we include political variables (*PRESIDENT)* to control the impact of the political party in power on executive compensation. To control the impact of other risk measures, we include systematic risk *(SYS_RISK)* and bankruptcy risk *(ZSCORE_DUM)* in our estimations. We provide detailed definitions and data sources for all variables in Appendix A.

3.3 Sample Distribution and Descriptive Statistics

We present compensation sample distribution in Table 3.1. The full sample includes 73,695 firm-year observations based on 2,354 unique firms over the period of 1992 to 2009. Panel A presents the time series distribution of salary, bonuses, equity compensation, total compensation and idiosyncratic volatility. Panel B presents the distribution of the compensation variables by sales group. Panel B presents distribution of components of executive pay and idiosyncratic risk. Panel C presents the cross-sectional distributions of the same variables by industry. The industry breakdown is based on two-digit SIC codes.

All components of executive pay have been relatively unstable over the course of our sample period (Panel A). There is an upward trend in salary during our sample period. However, bonuses show an upward trend from 1992 to 2005, followed by a sharp decline and downward trend during and after 2005. There is an upward trend in equity compensation from 1992 until 2000, followed by a small decline in 2001, and a rapid decline during 2002 to 2004. However, after 2004, the equity component of executive pay has remained relatively stable.

Overall, executive pay has been relatively unstable during our sample period. Idiosyncratic risk has also been relatively unstable during our sample period. The lowest annualized idiosyncratic risk was 28.07% in 1992 and the highest was 44.33% in 2002.

Panel B presents distribution of average executive pay and idiosyncratic risk by firm size. During our sample period, all components of executive pay increase as firm size increases. For example, the average total executive compensation in firms with average annual sales of less than $200 million is $823.89 thousand; whereas the average total executive compensation in firms with over $1,500 million in annual sales is $3,586.01 thousand. However, idiosyncratic risk is negatively related to firm size. For example, as firm size increases, average annualized idiosyncratic risk decreases from 50.49% to 29.03%.

Panel C exhibits the cross-sectional variation in average executive pay and idiosyncratic volatility by industry. The industry breakdown is based on two-digit SIC codes. The number of observations in each industry ranges from a low of 17 (Depository Institutions) to a high of 6,908 (Business Services). There is also a considerable variation in idiosyncratic volatility across these industrial categories.

Table 3.1 Distribution of Executive Compensation, by Year, Firm Size and Industry

This table shows the time series (Panel A), firm size (Panel B) and industry (Panel C) distribution of different components of executive pay and idiosyncratic volatility. The sample contains 73,695 observations and covers the period of 1992 to 2009. All variables are defined in Appendix A.

Panel A: Average Compensation by Fiscal Year

Year	N	Salary	Bonus	Cash	Equity	Total	Ivol
1992	2291	333.66	194.64	528.30	315.31	1,126.97	0.2784
1993	3313	325.43	208.45	533.88	391.49	1,119.17	0.2995
1994	3554	331.21	239.15	570.37	479.09	1,244.62	0.3133
1995	3684	343.80	253.53	597.34	538.01	1,388.33	0.3038
1996	3984	352.82	276.94	629.76	787.21	1,726.22	0.3054
1997	4122	357.26	305.51	662.77	1,075.70	2,159.66	0.3158
1998	4293	369.79	311.83	681.62	1,384.96	2,506.63	0.3352
1999	4264	381.39	350.65	732.03	1,443.44	2,656.91	0.3721
2000	4249	390.73	376.40	767.13	1,937.25	3,288.09	0.4135
2001	4187	408.35	318.98	727.33	1,685.49	2,967.96	0.4327
2002	4307	415.99	381.68	797.67	1,264.68	2,589.76	0.4348
2003	4747	415.07	399.74	814.81	1,034.90	2,265.07	0.4253
2004	5017	426.67	469.58	896.25	1,223.54	2,493.40	0.4115
2005	4657	465.87	547.05	1,012.92	1,377.32	2,768.92	0.3442
2006	5457	448.40	163.05	611.45	1,338.42	2,623.82	0.3183
2007	5787	454.23	93.80	548.03	1,362.72	2,603.98	0.2909
2008	1604	492.34	79.07	571.41	1,287.53	2,427.83	0.3058
2009	4178	496.81	92.64	589.45	1,209.45	2,425.67	0.3208

Panel B: Average Compensation by Fiscal Year

Sales Group	N	Salary	Bonus	Cash	Equity	Total	Ivol
Less than $200	6411	214.48	86.62	301.11	374.55	772.59	0.4937
$200 to $500	12513	275.40	136.17	411.56	537.90	1,108.01	0.4230
$500.01 to $100	13553	330.88	191.81	522.68	663.87	1,400.40	0.3717

Table 3.1 – Continued

$1000.01 to $1500	7927	380.27	230.69	610.96	873.25	1,836.70	0.3426
Above $1500	33291	523.91	443.24	967.15	1,824.02	3,571.30	0.2876

Panel C: Industry Average Compensation by 2-Digit SIC code

Industry	Sic2	.	Salary	Bonus	Cash	Equity	Total	Ivol
AGRICULTURAL PRODUCTION – LIVES	2	47	385.56	194.80	580.37	1,283.51	2,268.46	0.4193
AGRICULTURAL SERVICES	7	73	401.33	314.96	716.29	602.00	1,575.39	0.2686
AMUSEMENT & RECREATION SERVICES	79	654	504.28	345.37	849.65	1,145.11	2,402.51	0.4320
APPAREL AND ACCESSORY STORES	56	1807	471.08	269.41	740.50	1,008.21	2,077.48	0.4647
APPAREL AND OTHER TEXTILE PRODUC	23	902	440.12	248.44	688.56	747.70	1,810.49	0.3535
AUTO REPAIR, SERVICES, AND PARKI	75	227	435.53	270.05	705.58	3,189.90	4,826.33	0.3216
AUTOMOTIVE DEALERS & SERVICE STA	55	440	403.33	195.93	599.26	692.55	1,626.44	0.3638
BUSINESS SERVICES	73	6726	369.25	241.38	610.63	1,903.02	2,988.70	0.4284
CHEMICALS AND ALLIED PRODUCTS	28	5753	471.76	305.84	777.60	1,419.88	2,793.37	0.3187
COAL MINING	12	121	477.04	213.08	690.12	1,399.01	3,129.74	0.4318
COMMUNICATION	48	1841	606.26	696.28	1,302.54	2,693.95	5,188.85	0.3108
DEPOSITORY INSTITUTIONS	60	17	509.49	286.28	795.76	10,974.95	13,375.20	0.3885
EATING AND DRINKING PLACES	52	291	445.12	470.29	915.40	1,830.61	3,564.71	0.3330
EATING AND DRINKING PLACES	58	1862	369.81	225.47	595.28	796.76	1,794.05	0.3462
EDUCATIONAL SERVICES	82	467	309.49	168.69	478.19	904.67	1,693.53	0.3688
ELECTRIC, GAS, AND SANITARY SERV	49	5351	376.78	191.57	568.35	518.12	1,485.12	0.2125
ELECTRONIC & OTHER ELECTRIC EQUI	36	5388	345.16	248.38	593.54	1,186.71	2,159.96	0.4211
ENGINEERING & MANAGEMENT SERVICE	87	932	360.77	133.06	493.83	694.46	1,430.51	0.4082
FABRICATED METAL PRODUCTS	34	1249	380.15	292.89	673.04	768.05	1,893.23	0.2883
FOOD AND KINDRED PRODUCTS	20	2540	491.04	395.89	886.93	1,239.96	2,739.49	0.2552
FOOD STORES	54	620	418.21	200.26	618.47	930.61	1,858.40	0.2918
FURNITURE AND FIXTURES	25	613	357.03	196.68	553.72	599.98	1,500.10	0.2990
FURNITURE AND HOMEFURNISHINGS ST	57	574	462.55	192.21	654.76	1,447.07	2,447.37	0.4528

Table 3.1 - Continued

GENERAL BUILDLING CONTRACTORS	15	600	456.76	1,739.87	2,196.63	1,433.53	4,591.59	0.3777
GENERAL MERCHANDISE STORES	53	1167	542.00	307.22	849.23	1,358.86	2,632.74	0.3248
HEALTH SERVICES	80	1505	366.67	222.73	589.40	1,260.54	2,271.73	0.4341
HEAVY CONSTRUCTION, EXCEPT BUILD	16	340	391.75	246.21	637.95	601.28	1,522.52	0.3630
HOLDING AND OTHER INVESTMENT OFF	67	136	293.66	220.23	513.88	529.45	1,219.39	0.6601
HOTELS AND OTHER LODGING PLACES	70	161	455.40	312.82	768.22	1,462.07	2,707.30	0.3062
INDUSTRIAL MACHINERY AND EQUIPME	35	4766	383.57	245.33	628.90	1,607.72	2,798.89	0.3720
INSTRUMENTS AND RELATED PRODUCTS	38	4343	349.47	202.05	551.52	946.83	1,840.79	0.3751
INSURANCE AGENTS, BROKERS, & SER	64	468	478.71	661.83	1,140.54	1,304.33	2,884.75	0.3019
INSURANCE CARRIERS	63	627	342.07	254.71	596.79	828.65	1,736.10	0.3519
LEATHER AND LEATHER PRODUCTS	31	326	428.88	271.66	700.54	1,254.34	2,385.16	0.3630
LOCAL AND INTERURBAN PASSENGER T	41	56	332.72	121.60	454.32	167.64	745.61	0.8118
LUMBER AND WOOD PRODUCTS	24	381	328.94	273.54	602.48	290.49	1,181.59	0.2942
METAL MINING	10	215	470.05	434.65	904.69	2,025.89	4,019.50	0.4183
MISC. MANUFACTURING INDUSTRIES	39	430	478.79	286.98	765.77	819.14	2,119.56	0.3739
MISCELLANEOUS RETAIL	59	1557	391.92	234.82	626.74	1,264.07	2,232.80	0.4140
MOTION PICTURES	78	176	567.31	730.33	1,297.64	1,701.51	3,512.08	0.3300
NONCLASSIFIABLE ESTABLISHMENTS	99	55	615.05	892.23	1,507.28	2,064.24	4,824.54	0.2728
NONDEPOSITORY INSTITUTIONS	61	46	335.19	211.71	546.89	363.33	1,369.65	0.3897
NONMETALLIC MINERALS, EXCEPT FUE	14	186	364.05	215.83	579.88	621.39	1,479.94	0.3138
OIL AND GAS EXTRACTION	13	2394	337.42	300.49	637.91	1,271.38	2,367.47	0.3943
PAPER AND ALLIED PRODUCTS	26	1428	435.30	206.58	641.89	642.65	1,725.19	0.2708
PERSONAL SERVICES	72	492	375.76	116.54	492.30	550.53	1,344.28	0.3225
PETROLEUM AND COAL PRODUCTS	29	897	587.88	659.37	1,247.25	1,603.09	3,872.06	0.2399
PRIMARY METAL INDUSTRIES	33	1582	340.32	259.10	599.42	642.63	1,636.05	0.3454
PRINTING AND PUBLISHING	27	1237	451.51	292.98	744.49	832.56	1,945.24	0.2555
RAILROAD TRANSPORTATION	40	268	516.62	343.35	859.97	2,143.16	3,884.71	0.2299

Table 3.1 - Continued

RUBBER AND MISC. PLASTICS PRODUC	30	639	438.76	258.89	697.65	724.24	1,847.98	0.3083
SECURITY AND COMMODITY BROKERS	62	129	303.40	998.48	1,301.88	361.94	2,072.82	0.2889
SOCIAL SERVICES	83	51	248.47	124.38	372.85	501.50	1,068.86	0.3780
SPECIAL TRADE CONTRACTORS	17	133	341.46	132.27	473.73	511.91	1,356.16	0.4375
STONE, CLAY, AND GLASS PRODUCTS	32	492	341.92	183.06	524.97	420.63	1,184.46	0.3681
TEXTILE MILL PRODUCTS	22	514	365.45	172.73	538.18	335.97	1,049.96	0.3734
TOBACCO PRODUCTS	21	177	697.02	915.36	1,612.38	1,924.68	5,090.99	0.2680
TRANSPORTATION BY AIR	45	542	308.14	177.49	485.63	739.71	1,616.70	0.4164
TRANSPORTATION EQUIPMENT	37	2204	435.74	423.72	859.47	944.38	2,390.34	0.3098
TRANSPORTATION SERVICES	47	351	257.53	439.06	696.59	548.43	1,602.51	0.3155
TRUCKING AND WAREHOUSING	42	751	298.98	172.03	471.02	323.02	959.67	0.3231
WATER TRANSPORTATION	44	313	382.43	264.16	646.59	610.39	1,500.40	0.2842
WHOLESALE TRADE - DURABLE GOODS	50	1880	352.68	218.01	570.69	538.07	1,347.39	0.3604
WHOLESALE TRADE - NONDURABLE GOODS	51	1022	410.36	322.71	733.08	1,466.85	2,764.38	0.3401

We present CEO compensation sample distribution in Table 3.2. The full sample includes 24,253 observations over the period of 1992 to 2009. Panel A presents the time series distribution of salary, bonuses, equity compensation, total compensation and idiosyncratic volatility. Panel B exhibits the distribution of the compensation variables and idiosyncratic volatility by sales group.

All components of executive pay have been relatively unstable over the course of our sample period (Panel A). There is an upward trend in salary during our sample period. This trend is similar to average salary for all executives. CEOs' average total compensation increased from $1,518.99 thousand in 1992 to $5,331.11 thousand in 2000, followed by a small decrease in 2001. There is a sharp decline in CEOs' total pay during 2002 and 2003. During 2004 to 2009 CEOs' total pay remains relatively stable. Overall CEOs' average total pay has increased several times over during our sample period. Idiosyncratic risk has also been volatile during our sample period. Panel B exhibits CEOs' average salary, bonuses, cash compensation, equity compensation, total compensation and firms' idiosyncratic volatility by firm size during our sample period. CEOs' pay also positively related to firm size whereas idiosyncratic risk is negatively related to firm size.

Table 3.2 Distribution of CEO Compensation, by Year and Firm Size

This table shows the time series (Panel A) and firm size (Panel B) distribution of different components of CEO pay and idiosyncratic volatility. The sample contains 24,253 observations and covers the period of 1992 to 2009. All variables are defined in Appendix A.

Panel A: Average CEO Compensation by Fiscal Year							
Year	N	Salary	Bonus	Cash	Equity	Total	Ivol
1992	890	425.53	276.91	702.44	453.33	1,500.68	0.2660
1993	1328	424.69	302.26	726.95	594.14	1,554.92	0.2843
1994	1421	440.94	348.41	789.35	741.70	1,745.93	0.2968
1995	1481	455.22	367.17	822.39	819.34	1,956.22	0.2906
1996	1584	474.87	405.51	880.38	1,262.41	2,488.01	0.2912
1997	1635	480.40	450.34	930.75	1,758.51	3,186.76	0.3045
1998	1621	503.84	476.75	980.59	2,567.66	4,019.21	0.3240
1999	1623	519.52	526.22	1,045.74	2,385.22	3,945.25	0.3605
2000	1539	544.69	594.00	1,138.68	3,643.33	5,327.59	0.4036
2001	1436	580.23	525.98	1,106.21	3,197.64	4,864.90	0.4198
2002	1404	602.23	648.72	1,250.95	2,498.34	4,306.87	0.4262

Table 3.2 – Continued

2003	1423	617.77	719.11	1,336.88	2,073.67	3,925.30	0.4107
2004	1475	633.23	858.31	1,491.54	2,391.17	4,327.42	0.3982
2005	1378	677.43	973.62	1,651.05	2,615.71	4,942.80	0.3348
2006	1371	692.53	307.41	999.94	2,619.60	4,868.07	0.3112
2007	1314	721.98	197.68	919.66	2,872.64	5,124.98	0.2844
2008	366	784.72	135.06	919.78	2,669.55	4,722.79	0.3022
2009	964	792.96	165.14	958.10	2,500.83	4,709.55	0.3190

Panel B: Average CEO Compensation and Idiosyncratic Volatility by Sales Group

Sales Group	N	Salary	Bonus	Cash	Equity	Total	Ivol
Less than $200	1964	287.80	142.52	430.32	661.38	1,192.37	0.4837
$200 to $500	3891	378.77	222.87	601.64	945.64	1,732.64	0.4163
$500.01 to $1000	4441	456.82	307.21	764.03	1,132.84	2,148.10	0.3581
$1000.01 to $1500	2601	529.95	379.46	909.41	1,558.09	2,938.14	0.3307
Above $1500	11356	722.81	730.44	1,453.25	3,242.82	5,726.60	0.2809

Table 3.3 presents distribution of non-CEO executives' pay and idiosyncratic volatility. The non-CEO executives' sample includes 49,442 observations over the period of 1992 to 2009. Panel A presents the time series distribution of salary, bonuses, equity compensation, total compensation and idiosyncratic volatility. Panel B exhibits the distribution of the compensation variables and idiosyncratic volatility by sales group. Non-CEO executives' pay and idiosyncratic volatility follow similar trends as CEOs' pay and idiosyncratic volatility do in Table 3.2.

Table 3.3 Distribution of Non-CEO Compensation, by Year and Firm Size

This table shows the time series (Panel A) and firm size (Panel B) distribution of different components of non-CEO executive pay and idiosyncratic volatility. The sample contains 49,442 observations and covers the period of 1992 to 2009. All variables are defined in Appendix A.

Panel A: Average Non-CEO Executive Compensation by Fiscal Year

Year	N	Salary	Bonus	Cash	Equity	Total	Ivol
1992	1401	275.30	142.38	417.68	227.63	859.29	0.2862
1993	1985	259.02	145.70	404.71	255.92	797.02	0.3097
1994	2133	258.12	166.36	424.48	304.13	874.36	0.3242
1995	2203	268.90	177.14	446.04	348.88	969.63	0.3127
1996	2400	272.27	192.09	464.35	473.58	1,171.33	0.3147
1997	2487	276.31	210.30	486.60	626.81	1,399.82	0.3233
1998	2672	288.47	211.78	500.25	667.47	1,455.64	0.3420
1999	2641	296.50	242.75	539.25	864.68	1,747.28	0.3792
2000	2710	303.29	252.83	556.12	968.37	1,927.19	0.4192

Table 3.3 – Continued

2001	2751	318.63	210.93	529.56	896.16	1,811.28	0.4394
2002	2903	325.92	252.52	578.44	668.03	1,599.93	0.4390
2003	3324	328.29	263.03	591.32	590.21	1,439.47	0.4315
2004	3542	340.66	307.70	648.36	737.30	1,641.23	0.4171
2005	3279	376.96	367.78	744.74	856.89	1,827.91	0.3481
2006	4086	366.49	114.61	481.10	875.14	1,812.44	0.3208
2007	4473	375.57	63.28	438.85	891.52	1,817.25	0.2929
2008	1238	405.90	62.52	468.42	869.84	1,734.23	0.3068
2009	3214	407.98	70.90	478.88	822.11	1,740.65	0.3214

Panel B: Average Non-CEO Executive Compensation and Idiosyncratic Volatility by Sales Group

Sales Group	N	Salary	Bonus	Cash	Equity	Total	Ivol
Less than $200	4447	182.11	61.94	244.04	246.77	567.45	0.4981
$200 to $500	8622	228.75	97.04	325.78	351.82	799.16	0.4260
$500.01 to $1000	9112	269.50	135.56	405.06	432.79	1,000.21	0.3784
$1000.01 to $1500	5326	307.17	158.04	465.21	533.58	1,247.17	0.3484
Above $1500	21935	420.93	294.55	715.49	1,079.54	2,351.21	0.2911

In Table 3.4 we present summary statistics for our dependent and right-hand side variables in our estimations. The average salary for executives in our sample is $403.80 thousand with median salary being $330.83 thousand. The average bonus is $291 thousand and median bonus is $114.21 thousand. The average equity compensation is $1163.70 thousand and median equity pay is $291.32 thousand. Similarly, the average total compensation is $200.70 thousand with median value of $918.79 thousand. The average standard deviations of our dependent variables are very high. Equity compensation, for instance, has a standard deviation of 5,212.03%. Therefore, we use natural logarithm transformations of our compensation variables in our empirical tests.

Table 3.4 also presents summary statistics for our treatment variable: idiosyncratic risk and control variables. The average annualized idiosyncratic volatility in our sample is 35% with a standard deviation of 17%. For the period of 1992-2009, the average annual stockholder return was 10.5% and median value was 4.8% with a standard deviation of 43.4%. On average, firm size measured by total assets was $5497.60 million. The average executive age is 51.58

years with a standard deviation of 8.06%. Average turnover is .162 years with a 36.8% standard deviation. The average leverage was 51.9% whereas the median debt ratio is .53.

Table 3.4 Descriptive Statistics

This table shows the summary statistics of our dependent and explanatory variables used in this study. The sample contains 73,695 observations and covers the period of 1992 to 2009. All variables are defined in Appendix A.

Variables	N	Mean	Std.Dev	Min	P25	Median	P75	Max
SALARY	73695	403.80	280.96	0.00	225.00	330.83	500.00	8,100.00
BONUS	73695	291.00	717.92	0.00	0.00	114.21	315.60	35,500.00
EQUITY_COMP	72993	1,163.70	5,212.03	0.00	0.00	291.32	991.52	650,812.10
TOTAL_COMP	73695	2,000.70	5,615.38	0.00	463.30	918.79	1,987.79	655,448.00
IDIO_RISK	73695	0.350	0.170	0.082	0.234	0.316	0.427	4.256
SYS_RISK	73695	0.009	0.016	0.000	0.001	0.004	0.011	0.393
ZSCORE_DUM	73695	0.765	0.424	0.000	1.000	1.000	1.000	1.000
STOCK_RET	73695	0.105	0.434	-0.711	-0.176	0.048	0.295	2.342
ROA	73695	0.116	0.075	0.000	0.067	0.102	0.150	0.930
SIZE	73695	5,497.60	16,038.95	22.84	467.18	1,243.09	3,899.18	355,935.00
GROWTH_OPPORT	73695	2.084	1.629	0.453	1.237	1.627	2.353	78.562
CASH_SHORT	73695	-0.185	0.124	-0.941	-0.250	-0.172	-0.108	1.103
OPERATING_LOSS	73695	0.074	0.261	0.000	0.000	0.000	0.000	1.000
TAX_RATE	73695	0.300	0.458	0.000	0.000	0.000	1.000	1.000
DIV_CONS	73695	0.698	0.459	0.000	0.000	1.000	1.000	1.000
ADV_EXPENSE	73695	0.014	0.039	0.000	0.000	0.000	0.009	0.819
R&D_EXPENSE	73695	0.024	0.046	0.000	0.000	0.000	0.029	0.680
INVEST_EXPENSE	73695	0.054	0.056	-0.121	0.019	0.038	0.068	0.672
LEVERAGE	73695	0.519	0.217	0.024	0.378	0.531	0.657	4.530
FP_FACTOR	73695	-0.016	0.040	-0.152	-0.046	-0.016	0.014	0.235
DIV_YIELD	73695	2.703	15.072	0.000	0.000	0.164	1.290	1,294.4
AGE	73695	51.58	8.06	29.00	46.00	51.00	57.00	93.00
AGE2	73695	2725.7	861.6	841.0	2116.0	2601.0	3249.0	8649.0
DUALITY	73695	0.470	0.499	0.000	0.000	0.000	1.000	1.000
EXECDIR	73695	0.406	0.491	0.000	0.000	0.000	1.000	1.000
GENDER	73695	0.049	0.215	0.000	0.000	0.000	0.000	1.000
TURNOVER	73695	0.162	0.368	0.000	0.000	0.000	0.000	1.000
RATING_DUM	73695	0.492	0.500	0.000	0.000	0.000	1.000	1.000
PRESIDENT	73695	0.516	0.500	0.000	0.000	1.000	1.000	1.000

We also conduct correlation analysis but do not present due to space constraints. As far as independent variables are concerned, we do not see high correlation except where expected. For example, total asset is highly correlated to the squared of the total asset squared and executive age is highly correlated with age squared. However, all the other independent variables are not highly correlated. Therefore, we conclude that our sample does not form mulit-colinearity problems.

3.3 Hypothesis Development

A major prediction of agency theory is that there is a trade-off between risk and incentive compensation. Agents must be compensated for bearing additional risk, resulting in higher wage costs. Agency theory predicts that when placing some of the risk associated with the outcomes for a firm on its executives will align the preferences of executives with those of shareholders. Thus, firms must trade off higher incentives against higher wage costs, which can lead to a reduction of incentive-based compensation as risk increases. Conducting a direct test of the theory, Aggarwal and Samwick (1999) find results consistent with the theory that pay-performance sensitivity is decreasing in risk. Jin (2002) further supports this prediction. However, Core et al. (1999) finds a positive relationship between risk and compensation, challenging the prediction of agency theory. Prendergast (2000) further supports the findings of Core and Guay (1999) and explains several simple reasons why one might expect to find a positive relationship between risk and executive compensation. Prendergast (20002) further investigates the relationship between firm risk and executive pay. He argues that risky environment results in observation error in performance measures in agency models which results in a negative trade-off between risk and compensation. Another effect of uncertain environment is delegation of responsibilities to employees which generates incentive-based pay. Therefore, executives' incentives in uncertain environments must be higher. Given these empirical findings and theoretical explanation, we expect that there is a positive relationship between a firm's specific risk and executive compensation. These propositions lead us to the following hypothesis:

Hypothesis 1: *Ceteris paribus,* there is a positive relationship between executive pay and idiosyncratic volatility of stock returns (H1).

Executives in highly regulated[25] industries receive lower incentives from compensation or equity ownership since the reduced range of managerial discretion in these industries diminishes the consequences of good or bad decisions (Demsetz and Lehn, 1985; Smith and Watts, 1992). As Smith and Watts (1992) argue, regulations restrict a manager's investment discretion and reduce the marginal product of the decision-maker, so regulations should reduce the level of compensation. Jaskow, Rose, and Shepard (1993) examine the difference in CEO pay between regulated and unregulated firms. They find that regulated firms have lower levels of CEO pay while offering compensation that is less sensitive to CEO performance. Smith and Watts (1992) compare regulated and unregulated firms and find evidence that firms with greater investment opportunities employ more skilled executives resulting in both a higher level of pay and a more pronounced pay-performance relationship. However, Houston and James (1992) compare banks with non-banking firms and find no evidence of greater pay-performance sensitivity in banks than in non-banking firms. Houston and James (1992) also suggest that compensation does not reward bank CEOs for exploiting risk-taking opportunities because of the fixed-rate deposit insurance contract historically offered by Federal Deposit Insurance Corporation. Given this evidence, we expect idiosyncratic volatility to have less effect on executive pay in regulated firms than in non-regulated firms. This leads to the following hypothesis:

Hypothesis 2: *Ceteris paribus,* executive compensation in regulated firms will be relatively less sensitive to idiosyncratic volatility than in non-regulated firms (H2).

As documented by Ittner, Lambert and Lacker (2003), new economy firms[26] differ in many respects from old economy firms. New economy firms are smaller (in terms of sales and

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25 Number of studies (Demsetz and Lehn, 1985; Smith and Watts, 1992; Yermack, 1995) define insurance, gas and utility, and banking firms as regulated firms. Therefore, following prior researchers, we define firs with primary SIC designation of 6312-6312 (Insurance), 4911-4932 (Gas and Electric Utilities), and 6022-6026 (Banking) as regulated firms and others firms not defined above as non-regulated firms.
26 New economy firms are defined as companies with primary SIC designations of 3570 (Computer and Office Equipment), 3571 (Computer Storage Devices), 3576 (Computer Communication Equipment), 3677 (Computer Peripheral Equipment), 3661 (Telephone and Telegraph Apparatus), 3674 (Semiconductor and Related Devices), 4812 (Wireless Telecommunication), 4813 (telecommunication), 5045 (Computer and

employees, but not market value), are growing more rapidly, are investing more intensively in research and development, and have significantly lower marginal tax rates and accounting returns than do their old economy counterparts. They consider several factors that could plausibly explain the difference in compensation practices within new economy firms and between old and new economy firms, including growth opportunities, tax implications, and corporate cash-flow considerations. They document a large unexplained “new economy” effect that persists even after controlling for these economic factors.

Existing evidence suggests that one of the major differences between old and new economy firms is the degree of job entrenchment (Anderson, Banker, and Ravindran, 2000; and Ittner, Lambert, and Lacker, 2003). Employee entrenchment is an important element in the model of Berk, Stanton, and Zechner (2009). Entrenchment in their model references that employees are unable to fully insure their human capital risk[27]. Employees demand higher pay from a firm with higher risk. There is evidence suggesting that one of the differences between old and new economy firm lies in the degree of job entrenchment. The demand for executives and other critical employees in new economy firms is intense, leading to high turnover (Anderson, Banker, and Ravindran, 2000). Moreover, using a proprietary compensation survey, Ittner, Lambert, and Lacker (2003) find that new economy firms rank employee retention as one of the most important goals of their equity grant program. Given that employees in old economy firms are more entrenched than in new economy firms, we expect idiosyncratic volatility to have a stronger impact on compensation in old economy firms than in new economy firms. This discussion leads to our next hypothesis as follows:

Software Wholesalers), 5961 (Electronic Mail-Order Houses, 7370 (Computer Programming, Data Processing), 3771 (Computer Programming Services), 7372 (Prepackaged Software), and 7373 (Computer Integrated Systems Design). Old economy firms are firms with primary SIC codes less than 4000 not otherwise categorized as new economy firms. See Over and Shaefer (2001) for detail.

27 Berger, Ofek, and Yermack (1997) define entrenchment as “the extent to which managers fail to experience discipline from full range of corporate governance and control mechanism, including monitoring by the board, the threat of dismissal or takeover, and stock or compensation-based performance incentives”.

Hypothesis 3: *Ceteris paribus,* the impact of idiosyncratic volatility on executive pay is greater in old economy firms than in new economy firms (H3).

High-tech firms are relatively riskier firms with more growth opportunities. There are two different views of compensation and firm risk relationships in high-tech firms. According to the first view, there is a high degree of information asymmetry between CEOs and shareholders. This information asymmetry implies greater monitoring difficulties, leading to a higher demand for performance-based compensation in order to motivate the CEO to select value-maximizing projects (Jensen and Meckling, 1976; Smith and Watts, 1992; Lulseged and Christie, 2002; Prendergast, 2002). This suggests a positive relationship between compensation and risk. According to another view, tying compensation to a firm's market performance shifts risk away from well-diversified shareholders onto executives holding undiversified portfolios, and may result in inefficient risk sharing. In high-risk high-tech firms, tying compensation to market performance can be costly for a number of reasons, including the premium CEOs will demand for bearing the additional risk imposed on them by the compensation mix. This suggests that incentive-based compensation should decline with increases in risk (Core et al., 1999; Meulbroek, 2001; Jin, 2002; Lulseged and Christie, 2002; Nowlin and Christie, 2002). Based on these arguments, we argue that it is necessary to provide incentives to executives to take additional risk to implement high growth investment decisions. Therefore, the pay performance set up in high-tech firms gives less importance to idiosyncratic risk than non-tech firms. This discussion leads to the following hypothesis:

Hypothesis 4: *Ceteris paribus,* executive compensation in high-tech firms will be less sensitive to idiosyncratic volatility than in other firms (H4).

Compensation policy is often an important part of a firms' overall strategy. Firms deal with financial distress through provisions that change managers' incentives or facilitate negotiations with creditors (Gilson and Vetsuypens, 1993). A financially distressed firm may face strategic or political constraints on how much it can pay the CEO, regardless of his or her performance or skill level (Jensen, 1991; DeAngelo and DeAngelo, 1991). For example, creditors may be unwilling to grant the firm concessions under its debt-restructuring plan unless managers take a cut in their own compensation[28]. Moreover, the firm's directors who bear risk being sued or losing their jobs during financial distress (Gilson, 1990), may feel pressure to reduce senior managers' compensation to avoid any appearance of self-dealing (Gilson and Vetsuypens, 1993). Speculative firms are vulnerable to bankruptcy in absence of appropriate firm policy choices. Given these facts, we expect idiosyncratic volatility to have a stronger impact on compensation in speculative firms than in investment grade firms. This discussion leads to our next hypothesis as follows:

Hypothesis 5: *Ceteris paribus,* executive pay in speculative firms is more sensitive to idiosyncratic risk than in investment grade firms (H5).

Public opinion has been proposed as a potential disciplining device for corporate decisions (Zingales, 2000) and empirically has been shown to shape aspects of corporate governance, such as in the treatment of minority shareholders (Dyck and Zingales, 2002; Dyck, Volchkova and Zingales, 2008) or board independence (Joe, Louis and Robinson, 2009). The importance of press is further justified by Miller (2006). For example, Miller (2006) shows the press is important in the detection of corporate fraud. In the context of executive pay, Bebchuk, Fried, and Walker (2002) and Bebchuk and Fried (2004) argue that public outrage may limit CEO compensation. Weisbach (2007) suggests that firms may camouflage executive compensation by changing to forms that are typically not discussed in the press, so as not to attract public attention. However, empirically it is still unclear whether public opinion influences CEO pay.

We argue that public opinion and criticism on executive pay practices in public companies gets stronger during a recession when a firm’s performance cannot justify executive pay. In other words, a firm may face public criticism or political constraints on how much it can

28 DeAngelo and DeAngelo (1991) find an average 18% decline in salary and bonus of the CEOs of seven financially troubled domestic steel producers’ in years that their companies were seeking large wage concessions from their unions.

pay its executives. To address public and policy-makers' criticism, a firm may incorporate the effects of idiosyncratic risk on pay-performance set up more closely than in normal economic situations. Therefore, we expect idiosyncratic volatility to have a greater effect on executive pay during a recession than in normal economic situations. This leads to our following hypothesis:

Hypothesis 6: *Ceteris paribus,* executive pay during a recession is more sensitive to idiosyncratic risk than in normal or growth periods (H6).

Corporate governance is very important to executive pay. Lack of effective corporate governance may create a level playing field for executives. For example, a board of directors may not be able to work effectively to set up optimal compensation contracts. As Clark (1985) mentions, legal systems influence corporate governance because regulations may be an additional monitoring and control mechanism. Generally, asymmetric information costs tend to be higher in environments with relatively poor investors' protection, because weak investor protection mechanisms and poor economic prospects lead to a greater expropriation by managers, and thus to higher asymmetric information costs. Factors such as board size, independence, diversity, ownership, etc., may influence the effectiveness of a board's monitoring role (John and Senbet, 1998). These facts lead to our following hypothesis:

Hypothesis 7: *Ceteris paribus*, the impact of idiosyncratic risk on executive pay is greater in firms with good governance than in firms with poor governance (H7).

3.4 Methodology

In this section, we develop a methodology to estimate the effects of idiosyncratic volatility on executive pay. This methodology consists of a study of the link between idiosyncratic volatility and executive pay as a test of agency theory by answering several interrelated questions, including the following: (a) Does our pay-performance set up incorporate the effects of idiosyncratic volatility? (b) Does idiosyncratic volatility have a different impact on compensation in regulated firms than in non-regulated firms? (c) Does idiosyncratic volatility have a different impact on executive pay in high technology firms than in non-tech firms? (d)

How does idiosyncratic volatility affect compensation in new and in old economy firms? (e) Does idiosyncratic risk have a different impact on executive pay in firms with S&P ratings than in firms without ratings? (f) Does idiosyncratic risk affect executive pay differently during a recession than during normal or growth periods? (g) How does idiosyncratic risk influence executive pay in firms with good governance and in firms with poor governance? To address these concerns, we have developed a methodology in the following sections.

Our main goal is to estimate the effect of idiosyncratic volatility on executive pay[29]. In estimating the effects of idiosyncratic risk on pay for executive i working at firm j in year t, we estimate pooled cross-sectional regression as follows:

$$W_{it} = \alpha_0 + \alpha_1\ Idiosyncratic\ Risk_{it} + \alpha_2 Control\ Variables_{it} + \mu_t + \varepsilon_{it} \quad (3)$$

We include several control variables in our estimation. These variables include other risk variables, firm performance, characteristics, policy, executive characteristics, bond characteristics, governance and political control. When we include all control variables, we can re-write equation (3) as follows:

$$\begin{aligned} W_{it} = \ & \alpha_0 + \alpha_1 IDIO\_RISK_{it} + \alpha_2 SYS\_RISK_{it} + \alpha_3 ZSCORE\_DUM_{it} + \alpha_4 STOCK\_RET_{it} + a_5 ROA_{it} + \\ & \alpha_6 SIZE_{it} + \alpha_7 SIZE2_{it} + \alpha_8 GROWTH\_OPPORT_{it} + \alpha_9 CASH\_SHORT_{it} + \alpha_{10} OPERAT\_LOSS_{it} + \\ & \alpha_{11} TAX\_RATE_{it} + \alpha_{12} DIV\_CONS_{it} + \alpha_{13} XAD_{it} + \alpha_{14} XRD_{it} + \alpha_{15} INVEST\_EXP_{it} + \\ & \alpha_{16} LEVERAGE_{it} + \alpha_{17} FP\_FACTOR_{it} + \alpha_{18} DIV\_YIELD_{it} + \alpha_{19} AGE_{it} + \alpha_{20} AGE2_{it} + \\ & \alpha_{21} DUALITY_{it} + \alpha_{22} EXECDIR_{it} + \alpha_{23} GENDER_{it} + \alpha_{24} TURNOVER_{it} + \alpha_{25} RATE\_DUM_{it} + \\ & \alpha_{26} PRESIDENT_{it} + \alpha_i + \mu_t + \varepsilon_{it} \qquad (4) \end{aligned}$$

Where, W_{it} is compensation[30], α_i is industry effect, μ_t is a year effect, and ε_{it} is the error term. All other variables are defined in Appendix A.

The model presented in equation (4) is our benchmark model to explore the role of idiosyncratic risk on executive compensation. At first, using this model, we estimate the direct impact of idiosyncratic risk on executive's pay. We also use robust and quintile regression models to estimate the effect of idiosyncratic volatility on executive pay.

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29 This dissertation analyzes the effects of idiosyncratic risk on all executives, CEO and Non-CEO executives' pay separately.
30 Compensation refers to salary, bonus, equity compensation and total compensation.

In this study, we also hypothesize that idiosyncratic risk has a different impact in regulated versus non-regulated firms, new versus old economy firms, high-technology verses non-tech firms, investment grade versus speculative firms, and firms with good governance versus poor governance. Thus, we want to study whether idiosyncratic risk has a different impact on CEOs' pay in firms with these variations. Therefore, we use the following specification to analyze the different impact of idiosyncratic risk on our different groups of samples:

$$W_{it} = \alpha_0 + \alpha_1 IDIO\_RISK_{it} + \alpha_2 SYS\_RISK_{it} + \alpha_3 ZSCORE\_DUM_{it} + \alpha_4 STOCK\_RET_{it} + a_5 ROA_{it} + \alpha_5 SIZE_{it} + \alpha_6 GROWTH\_OPPORT_{it} + \alpha_7 CASH\_SHORT_{it} + \alpha_8 OPERAT\_LOSS_{it} + \alpha_9 TAX\_RATE_{it} + \alpha_{10} DIV\_CONS_{it} + \alpha_{11} INVEST\_EXP_{it} + \alpha_{12} LEVERAGE_{it} + \alpha_{13} FP\_FACTOR_{it} + \alpha_{14} DIV\_YIELD_{it} + \alpha_{15} AGE_{it} + \alpha_{16} DUALITY_{it} + \alpha_{17} EXECDIR_{it} + \alpha_{18} GENDER_{it} + \alpha_{19} TURNOVER_{it} + \alpha_{20} RATE\_DUM_{it} + \mu_t + \varepsilon_{it} \quad (5)$$

Where, W_{it} is compensation[31], μ_t is a year effect, and ε_{it} is the error term. All other variables are defined in Appendix A.

We divide our sample into two different groups to test our hypotheses. We estimate the effect of IDIO_RISK using ordinary least square regression in each group of samples. Then, using Wald Test, we compare the estimated coefficients between the two groups. We also conduct further tests using the following model to find whether IDIO_RISK has a different impact on CEOs' pay in our twos group of samples.

$$W_{it} = \alpha_0 + \alpha_1 IDIO\_RISK_{it} + \alpha_2 GROUP\_DUM_{it} + \alpha_3 GROUP\_DUM_{it} * IDIO\_RISK_{it} + \alpha_4 Control\ Variables_{it} + \varepsilon_{it} \quad (6)$$

Where, W_{it} is compensation[32] and ε_{it} is the error term. All other variables are defined in Appendix A.

We include several control variables in our estimation. These variables include other risk variables, firm performance, characteristics, policy, executive characteristics, bond

31 Compensation refers to CEO's salary or bonus or equity compensation or total compensation in different group of our sub sample. For example, when we analyze the differential impact of idiosyncratic risk on CEO's pay in new and old economy firms then Wit represents CEO's pay in new economy firms and old economy firms.
32 Compensation refers to CEO's salary or bonus or equity compensation or total compensation in different group of our sub sample. For example, when we analyze the differential impact of idiosyncratic risk on CEO's pay in new and old economy firms then Wit represents CEO's pay in new economy firms and old economy firms.

characteristics, governance and political control. When we include all control variables we can re-write equation (6) as follows:

$$W_{it} = \alpha_0 + \alpha_1 IDIO\_RISK_{it} + \alpha_2 GROUP\_DUM_{it} + \alpha_3 GROUP\_DUM_{it} * IDIO\_RISK_{it} + \alpha_4 SYS\_RISK_{it} + \alpha_5 ZSCORE\_DUM_{it} + \alpha_6 STOCK\_RET_{it} + a_7 ROA_{it} + \alpha_8 SIZE_{it} + \alpha_9 GROWTH\_OPPORT_{it} + \alpha_{10} CASH\_SHORT_{it} + \alpha_{11} OPERAT\_LOSS_{it} + \alpha_{12} TAX\_RATE_{it} + \alpha_{13} DIV\_CONS_{it} + \alpha_{14} CAPX_{it} + \alpha_{15} INVEST\_EXP_{it} + \alpha_{16} LEVERAGE_{it} + \alpha_{17} DIV\_YIELD_{it} + \alpha_{18} FP\_FACTOR_{it} + \alpha_{19} AGE_{it} + \alpha_{20} DUALITY_{it} + \alpha_{21} EXECDIR_{it} + \alpha_{22} GENDER_{it} + \alpha_{23} TURNOVER_{it} + \alpha_{24} RATE\_DUM_{it} + \varepsilon_{it} \quad (7)$$

The interaction of GROUP_DUM*IDIO_RISK indicates how idiosyncratic risk affects executive compensation. For example, $\alpha_3 > 0$ implies that the sensitivity of compensation to idiosyncratic risk increases when GROUP_DUM equals one. Similarly $\alpha_3 < 0$ implies that the sensitivity of compensation to idiosyncratic risk increases when GROUP_DUM equals one. Therefore, an estimate of the interaction term is the principal focus of the investigation. In other words, we are interested in the sign and statistical significance of the estimated co-efficient for the interaction term.

CHAPTER 4

ESTIMATION RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter analyzes and presents the main findings of our test results on the effects of idiosyncratic volatility on executive pay. Based on the methodology presented in Chapter 4, we test the relationship between idiosyncratic volatility and executive pay. We present our analysis results for all executives, CEOs and non-CEO executives separately.

4.2 Relationship between Idiosyncratic Risk and Compensation

This section presents the test results on our main hypothesis. We employ several regression models to examine the effects of idiosyncratic risk on executive pay. In this analysis, our dependent variable is executive pay. Executive pay includes salary, bonuses, equity, and total compensation. We analyze the effects of idiosyncratic risk on salary, bonuses, equity compensation, and total pay separately for executives, CEOs and non-CEO executives.

4.2.1 Relationship between Idiosyncratic Risk and Executive Compensation

This section presents and analyzes the effects of idiosyncratic risk on all top five executives' compensation. Executives' compensation refers to salary, bonus, equity and total compensation. Table 4.1 presents the empirical results from pooled regression model (1). We are interested in the sign of parameter estimates and the level of significance. A positive parameter indicates a positive relationship whereas a negative parameter indicates a negative relationship. According to hypothesis H1, we expect *IDIO_RISK* to have a positive effect on top executives' salary, bonuses, equity and total compensation.

Table 4.1 Relationship between Executive Compensation and Idiosyncratic Volatility- OLS Regression

This table shows the pooled regression results for executives' salary, bonuses, equity and total compensation. The table presents OLS regression results. The sample contains 73,695 firms-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0574***	1.7659***	1.6351***	0.8095***
		(0.015)	(0.098)	(0.091)	(0.036)
SYS_RISK	+	2.2052***	-31.5512***	19.9411***	6.1982***
		(0.590)	(2.467)	(1.516)	(0.988)
ZSCORE_DUM	+	0.0756***	0.1293***	0.1395***	0.1209***
		(0.006)	(0.022)	(0.014)	(0.008)
STOCK_RET	+	0.0080	0.4756***	-0.2054***	-0.0091
		(0.005)	(0.022)	(0.013)	(0.008)
ROA	+	0.4655***	4.4638***	0.2496*	0.8765***
		(0.039)	(0.177)	(0.101)	(0.063)
LSIZE	+	0.1877***	0.3732***	0.5757***	0.4165***
		(0.003)	(0.010)	(0.006)	(0.004)
SIZE2	-	0.0000	0.0000**	0.0000	0.0000***
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0120***	-0.0360***	0.0696***	0.0301***
		(0.002)	(0.008)	(0.007)	(0.004)
CASH_SHORTFALL	+	0.1529***	0.8491***	-0.4757***	0.0802**
		(0.024)	(0.085)	(0.051)	(0.031)
OPERATING_LOSS	-	-0.0270*	0.1225***	0.1487***	0.0078
		(0.011)	(0.035)	(0.023)	(0.014)
TAX_RATE	0	0.0692***	-0.4188***	0.2130***	0.1068***
		(0.005)	(0.021)	(0.011)	(0.007)
DIV_CONST	+	0.0199***	-0.0170	0.1416***	0.0558***
		(0.005)	(0.022)	(0.013)	(0.007)
ADV_EXPENSE	?	1.3644***	-0.8280**	0.9611***	1.0019***
		(0.059)	(0.254)	(0.166)	(0.089)
R&D_EXPENSE	-	0.3742***	-0.9048***	1.4562***	1.0069***
		(0.056)	(0.230)	(0.126)	(0.084)
INVEST_EXPENSE	+	-0.4036***	1.4594***	0.6554***	0.1683**
		(0.041)	(0.185)	(0.106)	(0.061)
LEVERAGE	-	0.0477***	0.1916***	-0.4493***	-0.1133***
		(0.012)	(0.052)	(0.031)	(0.018)
FP_FACTOR	+	-0.3116**	-5.2606***	-8.0154***	-3.4648***
		(0.097)	(0.407)	(0.262)	(0.144)
DIV_YIELD	-	0.0002	-0.0042**	-0.0033***	-0.0015***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	+	0.0324***	-0.0051	0.0287***	0.0549***
		(0.003)	(0.010)	(0.007)	(0.004)
AGE2	-	-0.0002***	-0.0001	-0.0003***	-0.0005***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.1490***	0.4287***	0.3067***	0.2833***
		(0.005)	(0.019)	(0.011)	(0.007)

Table 4.1 – Continued

EXECDIR	+	0.3929***	0.6331***	0.8005***	0.6806***
		(0.006)	(0.022)	(0.012)	(0.008)
GENDER	-	0.0275***	-0.3132***	-0.0234	-0.0224
		(0.008)	(0.042)	(0.024)	(0.013)
TURNOVER	?	-0.3275***	-0.1854***	-0.0229	-0.3418***
		(0.007)	(0.024)	(0.018)	(0.010)
RATING_DUM	+	0.0162*	0.1609***	0.0081	0.0190*
		(0.007)	(0.025)	(0.014)	(0.009)
PRESIDENT	+	0.1599***	-0.3852***	0.1909***	0.1584***
		(0.005)	(0.020)	(0.012)	(0.007)
CONSTANT		2.9061***	0.2486	-0.2487	1.2831***
		(0.072)	(0.272)	(0.193)	(0.097)
Observations		73695	73695	53515	73695
Adjusted R^2		0.41	0.11	0.41	0.48

Table 4.1 presents predicted sign on our main variable of interest and other control variables and test results of OLS regression model. Estimation results in columns one, two, three and four represent the natural logarithm of top executives' salary, bonuses, equity and total compensation. In all specifications, our regression results support our main hypothesis. In all specifications, estimated coefficients for *IDIO_RISK* are positive and statistically significant at one percent significance level. Even after controlling for systematic risk and bankruptcy risk, *IDIO_RISK* has a positive effect on all components of executives' compensation. Positive and statistically significant coefficient of *IDIO_RISK* in all models shows that there is a negative effect of idiosyncratic risk on top executives' salary, bonuses, equity and total pay, supporting H1.

Regression results in Table 4.1 also show that *SYS_RISK* is one of the most important determinants of executive salary. Positive and statistically significant coefficients of *IDIO_RISK* on top executives' salary, equity and total compensation regression indicate that firms exposed to high systematic risk compensate their executives with higher pay, and a negative and statistically significant coefficient in bonus regression indicates that executives' bonuses decrease with higher systematic risk. Similarly, the estimated coefficients of *ZSCORE_DUM* are also positive and highly significant for executives' salary, equity and total compensation indicating that firms with higher bankruptcy risk pay more salary, equity and total pay to their executives.

We use *STOCK_RET,* a measure of firm market performance and *ROA,* a measure of accounting performance to control the effects of firm performance on executives' compensation. The results are very interesting. In all specifications, *ROA* has positive and statistically significant coefficients which indicate that *ROA* has a positive effect on executives' pay. However, stock returns seem to be unrelated to executives' salary and total compensation and positively related to bonus compensation. A negative and statistically significant coefficient of *STOCK_RET* in equity regression shows that executives receive higher equity compensation when their firms' stock returns are declining.

We use *TOTAL_ASSET, GROWTH_OPPERT, CASH_SHORT, OPERATING_LOSS, TAX_RATE* and *DIV_CONS* to control for firm characteristics. As expected, in all specifications firm size measured by *TOTAL_ASSET* is positively related with all components of executives' compensation. However, estimation results for *TOTAL_ASSET2* indicate that there is a linear relationship between executives' pay and firm size. A negative and statistically significant coefficient of *GROWTH_OPPERT* in salary and bonus regression, and statistically significant positive coefficients in equity and total pay regression show that firms with higher *GROWTH_OPPERT* pay lower cash compensation and higher equity and other compensation to their top executives. As expected, regression results show that *CASH_SHORT* has a positive effect on salary, bonuses and total pay but a negative effect on equity pay. As expected, *DIV_CONS* is positively related to salary, equity and total pay but not related to bonus compensation.

We use XAD, XRD, INVEST_EXP, LEVERAGE and DIV_YIELD as firm policy variables in our estimation. Contrary to our expectation, regression results show a positive effect of R&D expense on executives' bonuses, equity and total pay and a negative effect on salary. Leverage is positively related to cash compensation and negatively related to equity and total pay. Following Guay (1999), we compute a factor using book-to-market, research and development expense and investment expenditure. When we include a firm policy factor in our estimation, contrary to our expectation, we find a negative impact of *FP_FACTOR* on all components of executive pay. As expected, dividend yield has negative and statistically significant coefficients for bonuses, equity and total pay but no effect on salary compensation.

Executives' characteristics are other important determinants of executives' pay. Our regression results show that executive characteristics such as *AGE, DUALITY and EXECDIR* are positively related to executives' pay. However, a negative coefficient of *AGE2* shows that there is not a linear relationship between executives' pay and executives' age. Another important component is executive *TURNOVER. A* negative and statistically significant coefficient of *TURNOVER* shows a negative relationship between executives' pay and *TURNOVER. The* relationship between *GENDER* and executive salary is not clear. OLS regression results show a positive effect on salary and a negative effect on bonus pay, but no effect on executives' equity and total compensation.

In conclusion, even after controlling for several variables, our OLS regression results show that executives' pay is positively related to firm risk. These results indicate that the compensation system in public firms encourages risk taking behavior. In all specifications, *IDIO_RISK* is negatively related to executives' pay, which does support our H1. These results are consistent with Guay (1999) and Core and Guay (1999), but do not support Aggarwal and Samwick (1999) and Jin (2002).

Table 4.2 Relationship between Executive Compensation and Idiosyncratic Volatility – OLS Regression with Industry and Firm Effects

This table shows the pooled regression results for executives' salary, bonuses, equity and total compensation. The table presents OLS regression results after controlling for industry and year effects. The sample contains 73,695 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0379*	-0.0790	1.3187***	0.5247***
		(0.016)	(0.062)	(0.039)	(0.023)
SYS_RISK	+	-1.2507*	-3.4319	7.1116***	0.7540
		(0.521)	(2.001)	(1.275)	(0.761)
ZSCORE_DUM	+	0.0432***	0.0013	0.0696***	0.0671***
		(0.005)	(0.020)	(0.013)	(0.007)

Table 4.2 – Continued

STOCK_RET	+	0.0047	0.6129***	-0.1805***	0.0012
		(0.005)	(0.019)	(0.012)	(0.007)
ROA	+	0.3367***	5.0524***	0.1434	0.7619***
		(0.038)	(0.147)	(0.095)	(0.056)
LSIZE	+	0.1779***	0.4781***	0.5496***	0.4029***
		(0.002)	(0.008)	(0.005)	(0.003)
GROWTH_OPPORT	+	-0.0126***	-0.0481***	0.0612***	0.0259***
		(0.002)	(0.007)	(0.004)	(0.003)
CASH_SHORTFALL	+	0.1706***	1.0485***	-0.2783***	0.1670***
		(0.020)	(0.076)	(0.049)	(0.029)
OPERATING_LOSS	-	-0.0243**	0.0320	0.1421***	-0.0035
		(0.008)	(0.032)	(0.021)	(0.012)
TAX_RATE	0	0.0144**	-0.0196	0.0617***	0.0326***
		(0.005)	(0.018)	(0.011)	(0.007)
DIV_CONST	+	-0.0008	0.0518**	0.0988***	0.0192**
		(0.005)	(0.019)	(0.012)	(0.007)
ADV_EXPENSE	?	0.7586***	0.0305	0.5514***	0.6341***
		(0.057)	(0.220)	(0.149)	(0.083)
R&D_EXPENSE	-	0.4296***	0.1140	1.5559***	1.1863***
		(0.059)	(0.226)	(0.142)	(0.086)
INVEST_EXPENSE	+	-0.1678***	1.2773***	0.8384***	0.3269***
		(0.043)	(0.163)	(0.104)	(0.062)
LEVERAGE	-	0.1230***	-0.0119	-0.2571***	-0.0131
		(0.011)	(0.044)	(0.029)	(0.017)
FP_FACTOR	+	-0.2712**	-2.7526***	-7.4802***	-3.0234***
		(0.092)	(0.354)	(0.229)	(0.135)
DIV_YIELD	-	-0.0000	-0.0032***	-0.0034***	-0.0017***
		(0.000)	(0.001)	(0.000)	(0.000)
AGE	+	0.0298***	0.0592***	0.0290***	0.0578***
		(0.002)	(0.008)	(0.006)	(0.003)
AGE2	-	-0.0002***	-0.0006***	-0.0003***	-0.0005***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.1638***	0.2457***	0.3141***	0.2839***
		(0.004)	(0.017)	(0.011)	(0.006)
EXECDIR	+	0.4072***	0.3766***	0.8861***	0.7011***
		(0.005)	(0.019)	(0.012)	(0.007)
GENDER	-	-0.0069	-0.0707*	-0.0955***	-0.0491***
		(0.009)	(0.036)	(0.023)	(0.014)
TURNOVER	?	-0.3443***	-0.1192***	0.1247***	-0.2870***
		(0.006)	(0.023)	(0.016)	(0.009)
RATING_DUM	+	0.0511***	-0.1925***	0.0966***	0.0510***
		(0.006)	(0.021)	(0.014)	(0.008)
PRESIDENT	+	0.3103***	-0.1906**	-0.4775***	0.1092***
		(0.015)	(0.059)	(0.043)	(0.022)
CONSTANT	?	2.8907***	-0.3205	-0.4083	1.0023***
		(0.073)	(0.281)	(0.212)	(0.107)
Industry effect		Yes	Yes	Yes	Yes
Year effect		Yes	Yes	Yes	Yes
Observations		73695	73695	53515	73695
Adjusted R^2		0.44	0.37	0.46	0.51

In Table 4.2, we report the empirical results from pool regression model (1) for executives' compensation. In this test, we estimate the effect of *IDIO_RISK* on executives' salary, bonuses, equity and total compensation with industry and year effect in addition to the control variables in Table 4.1. Except for the bonus model, all of the reported results support that *IDIO_RISK* influences top executives' salary, equity and total compensation positively. Overall, the estimation results in Table 4.2 support the findings of Table 4.1, thus supporting our H1.

After controlling for industry and firm effect, *SYS_RISK* is negatively related to executive salary and positively related to equity compensation, whereas there is no effect on bonuses and total pay. As expected, *ROA* is positively related to executives' salary, equity and total pay. *STOCK_RET* is positively related to bonus pay and negatively related to equity compensation, and there is no effect of *STOCK_RET* on executives' salary and total pay.

Regression results show that *SIZE* is positively related to all components of executives' pay even after controlling for industry and firm effects. Firm leverage has a positive effect on its executives' salary and a negative effect on equity pay, but no effect on bonuses and total compensation. As expected, *DIV_YIELD* has a negative effect on executive bonuses, equity and total pay, but no effect on salary. Executives' characteristics seem to be very important determinants of executives' pay. For example, our estimation results show that executives' *AGE, DUALITY* and *EXECDIR* have a positive effect on all components of executives' compensation.

Table 4.3 Relationship between Executive Compensation and Idiosyncratic Volatility – Robust Regression

This table shows the pooled regression results for executives' salary, bonuses, equity and total compensation. The table presents robust regression results after controlling for industry and year effects. The sample contains 73,695 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0631***	0.1712***	1.6276***	0.5572***
		(0.010)	(0.026)	(0.034)	(0.021)
SYS_RISK	+	-0.9215**	-1.2717	2.9122**	1.2931
		(0.311)	(0.834)	(1.103)	(0.678)
ZSCORE_DUM	+	0.0234***	-0.0269***	0.0636***	0.0534***
		(0.003)	(0.008)	(0.011)	(0.007)

Table 4.3 – Continued

STOCK_RET	+	0.0012	0.1608***	-0.1994***	0.0105
		(0.003)	(0.008)	(0.011)	(0.007)
ROA	+	0.2063***	1.8640***	-0.0057	0.7924***
		(0.023)	(0.061)	(0.082)	(0.050)
LSIZE	+	0.1900***	0.3322***	0.5531***	0.4110***
		(0.001)	(0.003)	(0.004)	(0.003)
GROWTH_OPPORT	+	-0.0060***	-0.0107***	0.0781***	0.0311***
		(0.001)	(0.003)	(0.004)	(0.002)
CASH_SHORTFALL	+	0.1415***	0.4635***	-0.2552***	0.1543***
		(0.012)	(0.032)	(0.042)	(0.026)
OPERATING_LOSS	-	-0.0024	-0.0016	0.0951***	0.0231*
		(0.005)	(0.013)	(0.018)	(0.011)
TAX_RATE	0	0.0059*	0.0040	0.0541***	0.0323***
		(0.003)	(0.008)	(0.010)	(0.006)
DIV_CONST	+	0.0042	0.0497***	0.0820***	0.0174**
		(0.003)	(0.008)	(0.010)	(0.006)
ADV_EXPENSE	?	0.8531***	0.6119***	0.6119***	0.7606***
		(0.034)	(0.092)	(0.128)	(0.074)
R&D_EXPENSE	-	0.5334***	0.0292	1.3476***	1.3560***
		(0.035)	(0.094)	(0.123)	(0.077)
INVEST_EXPENSE	+	-0.2466***	0.2807***	0.8820***	0.3235***
		(0.025)	(0.068)	(0.090)	(0.055)
LEVERAGE	-	0.0822***	0.1405***	-0.2803***	-0.0404**
		(0.007)	(0.018)	(0.025)	(0.015)
FP_FACTOR	+	-0.1664**	-2.1263***	-6.9892***	-2.9218***
		(0.055)	(0.147)	(0.198)	(0.120)
DIV_YIELD	-	-0.0003**	-0.0048***	-0.0036***	-0.0018***
		(0.000)	(0.000)	(0.000)	(0.000)
AGE	+	0.0232***	0.0239***	0.0213***	0.0561***
		(0.001)	(0.003)	(0.005)	(0.003)
AGE2	-	-0.0001***	-0.0001***	-0.0003***	-0.0005***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.1554***	0.2083***	0.3030***	0.2775***
		(0.003)	(0.007)	(0.009)	(0.006)
EXECDIR	+	0.4641***	0.5727***	0.9102***	0.7119***
		(0.003)	(0.008)	(0.010)	(0.006)
GENDER	-	-0.0274***	-0.0748***	-0.0854***	-0.0721***
		(0.006)	(0.015)	(0.020)	(0.012)
TURNOVER	?	-0.2035***	-0.1364***	0.1626***	-0.2710***
		(0.004)	(0.010)	(0.014)	(0.008)
RATING_DUM	+	0.0421***	-0.0219*	0.0686***	0.0417***
		(0.003)	(0.009)	(0.012)	(0.007)
PRESIDENT	+	0.1756***	0.0318	-0.5578***	0.0929***
		(0.009)	(0.025)	(0.037)	(0.020)
CONSTANT	?	2.9882***	1.1064***	-0.1567	0.9540***
		(0.044)	(0.117)	(0.183)	(0.095)
Industry effect		Yes	Yes	Yes	Yes
Year effect		Yes	Yes	Yes	Yes
Observations		73695	73695	53515	73695
Adjusted R^2		0.69	0.88	0.53	0.57

In Table 4.3, we report the empirical results of a robust regression model. In these tests we estimate the effect of *IDIO_RISK* on executives' salary, bonuses, equity-based compensation and total compensation. According to H1, there is a negative effect of *IDIO_RISK* on all components of executives' pay. All of the reported results suggest that *IDIO_RISK* positively influences top executives' salary, bonuses, equity and total compensation suggesting that executives are rewarded for taking more idiosyncratic risk. Again these finding support our H1.

Regression results in Table 4.3 also show a positive and highly significant coefficient of *SYS_RISK* in executives' equity-based compensation and a negative and statistically significant coefficient in salary regression. These reported results show that systematic risk is negatively related to executives' salary and positively related to equity-based compensation. However, *SYS_RISK* seems to have no effect on bonuses and total pay. Estimation results also show that *ZSCORE_DUM* is positively related to executives' salary, equity and total pay but negatively related to bonus compensation. Regression results show that *STOCK_RET* is positively related to bonus compensation and negatively related to equity compensation. However, statistically insignificant coefficient of *STOCK_RET* for both salary and total compensation regressions show that stock return does not influence executes' salary and total compensation.

Table 4.4 Relationship between Executive Compensation and Idiosyncratic Volatility – Median Regression

This table shows the pooled regression results for executives' salary, bonuses, equity and total compensation. The table presents median regression results after controlling for industry and year effects. The sample contains 73,695 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0562***	0.0923**	1.5091***	0.5688***
		(0.011)	(0.034)	(0.040)	(0.023)
SYS_RISK	+	-1.3703***	-1.1662	4.2523**	1.7382*
		(0.360)	(1.116)	(1.297)	(0.738)
ZSCORE_DUM	+	0.0246***	-0.0298**	0.0713***	0.0555***
		(0.004)	(0.011)	(0.013)	(0.007)
STOCK_RET	+	0.0004	0.3105***	-0.1962***	0.0047
		(0.003)	(0.011)	(0.013)	(0.007)

Table 4.4 – Continued

ROA	+	0.1813***	2.8177***	0.0378	0.7892***
		(0.026)	(0.082)	(0.097)	(0.054)
LSIZE	+	0.1900***	0.3765***	0.5501***	0.4112***
		(0.001)	(0.004)	(0.005)	(0.003)
SIZE2	-	-0.0000*	0.0000	0.0000	0.0000***
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0071***	-0.0397***	0.0733***	0.0316***
		(0.001)	(0.004)	(0.004)	(0.002)
CASH_SHORTFALL	+	0.1368***	0.6028***	-0.2689***	0.1684***
		(0.014)	(0.042)	(0.050)	(0.028)
OPERATING_LOSS	-	-0.0014	-0.0053	0.1222***	0.0250*
		(0.006)	(0.018)	(0.021)	(0.012)
TAX_RATE	0	0.0097**	0.0004	0.0646***	0.0355***
		(0.003)	(0.010)	(0.012)	(0.007)
DIV_CONST	+	0.0029	0.0590***	0.0807***	0.0138*
		(0.003)	(0.010)	(0.012)	(0.007)
ADV_EXPENSE	?	0.7716***	0.3664**	0.5318***	0.6963***
		(0.040)	(0.123)	(0.151)	(0.081)
R&D_EXPENSE	-	0.5426***	0.1851	1.5540***	1.2716***
		(0.041)	(0.126)	(0.145)	(0.084)
INVEST_EXPENSE	+	-0.2376***	0.6443***	0.8508***	0.3552***
		(0.029)	(0.091)	(0.106)	(0.061)
LEVERAGE	-	0.0964***	0.1057***	-0.2902***	-0.0591***
		(0.008)	(0.024)	(0.030)	(0.016)
FP_FACTOR	+	-0.2505***	-2.8706***	-6.9084***	-3.0989***
		(0.064)	(0.197)	(0.233)	(0.131)
DIV_YIELD	-	-0.0002	-0.0029***	-0.0032***	-0.0019***
		(0.000)	(0.000)	(0.000)	(0.000)
AGE	+	0.0241***	0.0497***	0.0243***	0.0604***
		(0.001)	(0.005)	(0.006)	(0.003)
AGE2	-	-0.0001***	-0.0004***	-0.0003***	-0.0006***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.1495***	0.2124***	0.2955***	0.2708***
		(0.003)	(0.009)	(0.011)	(0.006)
EXECDIR	+	0.4882***	0.5533***	0.9195***	0.7208***
		(0.003)	(0.010)	(0.012)	(0.007)
GENDER	-	-0.0288***	-0.0847***	-0.0731**	-0.0579***
		(0.006)	(0.020)	(0.023)	(0.013)
TURNOVER	?	-0.2192***	-0.1505***	0.1349***	-0.2994***
		(0.004)	(0.013)	(0.017)	(0.009)
RATING_DUM	+	0.0403***	-0.0420***	0.0756***	0.0533***
		(0.004)	(0.012)	(0.014)	(0.008)
PRESIDENT	+	0.1843***	-0.0387	-0.5831***	0.1194***
		(0.011)	(0.033)	(0.044)	(0.022)
CONSTANT	?	2.9828***	0.3430*	-0.4398*	0.8452***
		(0.051)	(0.157)	(0.215)	(0.104)
Industry effect		Yes	Yes	Yes	Yes
Year effect		Yes	Yes	Yes	Yes
Observations		73695	73695	53515	73695
Pseudo R^2		.42	.33	.32	.35

In Table 4.4, we report the empirical results from pool regression model (1). In this test we estimate the relationship between executive compensation and *IDIO_RISK*. According to H1, we expect a positive relationship between *IDIO_RISK* and executives' pay. Our regression results support our main hypothesis by showing a positive and statistically significant coefficient for *IDIO_RISK* in specifications. When we estimate the effect of *IDIO_RISK* on executives' salary, bonuses, equity and total compensation using median regression, again we find that *IDIO_RISK* positively affects all components of executives' pay, holding everything else constant.

Regression results in Table 4.4 also show that *SYS_RISK* is negatively related to executives' salary and positively related to both equity and total compensation. However, there is no relationship between *SYS_RISK* and bonus compensation. We also include *ZSCORE_DUM* in the estimation. Regression results show that bankruptcy risk is positively related to executives' salary, equity and total compensation and negatively related to bonus compensation.

To sum, we estimate the effect of *IDIO_RISK* on executives' compensation using different regression models. Following prior research, we also control for the industry and year effect on our estimation. Our study is the most comprehensive research on this issue so far. We control for all possible variables included in prior research on executive compensation. The estimate coefficient for *IDIO_RISK* remains positive and highly significant in a majority of estimations even after controlling for several variables used in prior studies. Therefore, we conclude that there is a positive relationship between executives' pay and idiosyncratic risk. In other words, *IDIO_RISK* has a positive effect on top executives' salary, bonuses, equity and total compensation. These findings are contrary to the most recent findings of Aggarwal and Samwick (1999) and Jin (2002), but are consistent with the findings of Guay (1999), Core and Guay (1999) and the theoretical findings of Prendergast (2000, 2002).

4.2.2 Relationship between Idiosyncratic Risk and CEO Compensation

In this section we analyze the effect of idiosyncratic risk on different components of CEO compensation. We analyze and present estimation results on the relationship between CEOs' compensation and idiosyncratic volatility using different regression models.

Table 4.5 Relationship between CEO Compensation and Idiosyncratic Volatility – OLS Regression

This table shows the pooled regression results for CEOs' salary, bonuses, equity and total compensation. The table presents OLS regression results. The sample contains 24,253 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0677*	1.4392***	1.5133***	0.9132***
		(0.028)	(0.175)	(0.174)	(0.080)
SYS_RISK	+	1.0555	-25.9444***	27.9944***	11.2292***
		(1.544)	(4.909)	(2.795)	(2.315)
ZSCORE_DUM	+	0.1109***	0.1833***	0.1171***	0.1760***
		(0.012)	(0.042)	(0.024)	(0.016)
STOCK_RET	+	0.0166	0.6839***	-0.1906***	-0.0038
		(0.012)	(0.042)	(0.023)	(0.016)
ROA	+	0.7633***	5.9362***	0.3323	1.1600***
		(0.081)	(0.337)	(0.188)	(0.125)
LSIZE	+	0.1770***	0.4252***	0.5715***	0.4367***
		(0.008)	(0.019)	(0.011)	(0.008)
SIZE2	-	0.0000	0.0000	0.0000**	0.0000***
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0178***	-0.0658***	0.0764***	0.0261***
		(0.005)	(0.014)	(0.014)	(0.008)
CASH_SHORTFALL	+	0.1714***	1.1525***	-0.3373***	0.1593**
		(0.052)	(0.162)	(0.088)	(0.059)
OPERATING_LOSS	-	-0.0822**	0.0986	0.1092**	-0.0600*
		(0.027)	(0.068)	(0.040)	(0.030)
TAX_RATE	0	0.0685***	-0.3834***	0.2169***	0.1173***
		(0.010)	(0.041)	(0.019)	(0.013)
DIV_CONST	+	0.0237*	0.0341	0.1490***	0.0708***
		(0.010)	(0.040)	(0.022)	(0.013)
ADV_EXPENSE	?	1.2608***	-1.1372*	1.6473***	0.9516***
		(0.114)	(0.473)	(0.236)	(0.172)
R&D_EXPENSE	-	0.2020	-0.6291	1.4450***	1.1133***
		(0.106)	(0.456)	(0.231)	(0.164)
INVEST_EXPENSE	+	-0.2478**	1.9696***	0.8599***	0.4202***
		(0.089)	(0.350)	(0.187)	(0.115)
LEVERAGE	-	0.1298***	0.1944	-0.4373***	-0.0334
		(0.028)	(0.107)	(0.056)	(0.038)
FP_FACTOR	+	0.0135	-5.6839***	-8.5629***	-3.9689***
		(0.222)	(0.783)	(0.478)	(0.292)

Table 4.5 – Continued

DIV_YIELD	-	0.0001	-0.0060	-0.0052***	-0.0026***
		(0.000)	(0.003)	(0.001)	(0.001)
AGE	+	0.0433***	0.0555**	0.0334**	0.0700***
		(0.005)	(0.020)	(0.012)	(0.007)
AGE2	-	-0.0003***	-0.0005**	-0.0004**	-0.0006***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.0891***	0.7541***	-0.0971**	0.1377***
		(0.024)	(0.064)	(0.030)	(0.028)
EXECDIR	+	0.4342***	0.2109***	0.9241***	0.7668***
		(0.012)	(0.044)	(0.026)	(0.017)
GENDER	-	0.0719**	-0.4147**	0.1370*	0.0405
		(0.023)	(0.129)	(0.064)	(0.040)
TURNOVER	?	-0.3514***	-0.0239	-0.0173	-0.2180***
		(0.016)	(0.051)	(0.037)	(0.022)
RATING_DUM	+	0.0302	0.1380**	0.0411	0.0455*
		(0.015)	(0.046)	(0.025)	(0.018)
PRESIDENT	+	0.1836***	-0.4110***	0.2941***	0.2042***
		(0.009)	(0.038)	(0.021)	(0.013)
CONSTANT		2.6279***	-2.0650***	-0.0544	0.6173**
		(0.145)	(0.544)	(0.341)	(0.204)
Observations		24253	24253	18282	24253
Adjusted R^2		0.29	0.10	0.40	0.42

In Table 4.5, we present OLS regression results. In all specifications, *IDIO_RISK* has positive and statistically significant coefficients indicating a positive effect of *IDIO_RISK* on CEO pay. These findings support our hypothesis that *IDIO_RISK* has a positive effect on CEOs' compensation. These results are similar to the results presented in Table 4.1. Thus, all of the reported results support that *IDIO_RISK* is positively related to all executives' as well as CEOs' compensation. The effects of *SYS_RISK* and *ZSCORE_DUM* on CEOs are similar to those of executives' compensation reported in Table 4.1.

Regression results also show that *ROA* is positively related to CEOs' salary, bonuses and total compensation but not related to equity pay. However, *STOCK_RET* is positively related to CEOs' bonuses, negatively related to equity pay, and has no effect on CEOs' salary and total pay. Firm *SIZE* is positively related to all components of CEOs' pay. Firm *GROWTH_OPPORT* is negatively related to CEOs' salary and bonus pay but positively related to equity and total compensation, suggesting that firms with higher growth opportunities pay lower cash compensation to their CEOs but pay higher equity and other compensation.

Moreover, CEOs' characteristics are other very important determinants of CEOs' pay. For example, our estimation results show that *AGE, DUALITY* and *EXECDIR* are positively related to CEOs' salary, bonuses, equity and total compensation, but *TURNOVER* is negatively related to CEOs' salary and total pay but not related to other components of CEOs' pay. Positive and statistically significant coefficients for PRES show that when a Republican serves as president of the United States of America, CEOs receive more salary, equity and total compensation. The negative coefficient of *PRES* in CEOs' bonus regression indicates that when a Republican president is in power, CEOs receive less bonus compensation.

Table 4.6 Relationship between CEO Compensation and Idiosyncratic Volatility – OLS Regression with Industry and Firm Effects

This table shows the pooled regression results for CEOs' salary, bonuses, equity and total compensation. The table presents OLS regression results after controlling for industry and year effects. The sample contains 24,253 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0181	-0.1545	1.0560***	0.5071***
		(0.033)	(0.115)	(0.063)	(0.043)
SYS_RISK	+	-2.9201*	-7.8512	10.1137***	1.7810
		(1.186)	(4.089)	(2.289)	(1.541)
ZSCORE_DUM	+	0.0620***	0.0498	0.0109	0.0940***
		(0.011)	(0.038)	(0.022)	(0.014)
STOCK_RET	+	0.0146	0.8263***	-0.1543***	0.0090
		(0.011)	(0.038)	(0.022)	(0.014)
ROA	+	0.5911***	6.2453***	0.1646	1.0000***
		(0.083)	(0.287)	(0.166)	(0.108)
LSIZE	+	0.1714***	0.5268***	0.5512***	0.4263***
		(0.004)	(0.015)	(0.009)	(0.006)
SIZE2	-	0.0000	0.0000	0.0000	0.0000**
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0186***	-0.0800***	0.0678***	0.0207***
		(0.004)	(0.014)	(0.008)	(0.005)
CASH_SHORTFALL	+	0.1706***	1.3893***	-0.1592	0.2405***
		(0.043)	(0.148)	(0.084)	(0.056)
OPERATING_LOSS	-	-0.0781***	0.0004	0.0947**	-0.0746**
		(0.018)	(0.063)	(0.037)	(0.024)
TAX_RATE	0	0.0273**	-0.0552	0.0537**	0.0352**
		(0.010)	(0.036)	(0.020)	(0.013)
DIV_CONST	+	-0.0037	0.0543	0.0975***	0.0270*
		(0.010)	(0.035)	(0.020)	(0.013)
ADV_EXPENSE	?	0.6952***	-0.2785	1.0399***	0.5743***
		(0.123)	(0.425)	(0.254)	(0.160)

Table 4.6 – Continued

R&D_EXPENSE	-	0.3930**	-0.1424	1.6020***	1.3492***
		(0.132)	(0.455)	(0.253)	(0.171)
INVEST_EXPENSE	+	-0.0815	1.8316***	0.9517***	0.4847***
		(0.092)	(0.316)	(0.179)	(0.119)
LEVERAGE	-	0.2073***	-0.0518	-0.2344***	0.0781*
		(0.025)	(0.087)	(0.052)	(0.033)
FP_FACTOR	+	0.0428	-3.5656***	-7.7126***	-3.3352***
		(0.203)	(0.699)	(0.400)	(0.263)
DIV_YIELD	-	-0.0000	-0.0052***	-0.0047***	-0.0027***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	+	0.0428***	0.0804***	0.0312**	0.0718***
		(0.005)	(0.017)	(0.011)	(0.006)
AGE2	-	-0.0003***	-0.0008***	-0.0003**	-0.0006***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.1336***	0.2007***	0.0175	0.1642***
		(0.015)	(0.051)	(0.030)	(0.019)
EXECDIR	+	0.4139***	0.4288***	0.9136***	0.7723***
		(0.012)	(0.041)	(0.024)	(0.016)
GENDER	-	0.0132	-0.0880	0.0282	-0.0129
		(0.030)	(0.104)	(0.059)	(0.039)
TURNOVER	?	-0.3895***	-0.0826	0.3673***	-0.0459*
		(0.017)	(0.057)	(0.034)	(0.022)
RATING_DUM	+	0.0492***	-0.1831***	0.1016***	0.0574***
		(0.012)	(0.041)	(0.023)	(0.015)
PRESIDENT	+	-0.0216	3.6535***	-0.4884***	-0.4063***
		(0.036)	(0.123)	(0.069)	(0.046)
CONSTANT		2.8271***	-5.3082***	-0.7902*	0.6275**
		(0.170)	(0.587)	(0.368)	(0.221)
Industry effect		Yes	Yes	Yes	Yes
Year effect		Yes	Yes	Yes	Yes
Observations		24253	24253	18282	24253
Adjusted R^2		0.32	0.32	0.46	0.46

In Table 4.6, we present OLS regression results after controlling for industry and year effect. Interestingly, *IDIO_RISK* has positive and statistically significant coefficients only for CEOs' equity and total compensation. The results show that *IDIO_RISK* has a positive effect on CEOs' equity and total pay but no effect on salary and bonus pay. *SYS_RISK* has a negative effect on CEOs' salary and a positive effect on total pay, but no effect on bonuses and equity compensation. *ZSCORE_DUM* positively affects CEOs' salary and total pay but does not have any effect on CEOs' bonuses and equity pay.

Moreover, regression results show that *STOCK_RET* has a positive effect on CEOs' bonuses and a negative effect on equity compensation, but no effect on salary and total pay.

However, *ROA* has a positive effect on CEOs' salary, bonuses and total compensation, but no effect on equity compensation. As reported in earlier results, firm size is positively related to all components of CEOs' pay. CEOs' characteristics are also very important in explaining CEOs' compensation.

Table 4.7 Relationship between CEO Compensation and Idiosyncratic Volatility – Robust Regression

This table shows the pooled regression results for CEOs' salary, bonuses, equity and total compensation. The table presents robust regression results. The sample contains 24,253 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0458**	0.2094***	1.5938***	0.5523***
		(0.016)	(0.041)	(0.055)	(0.037)
SYS_RISK	+	-0.9128	-0.4980	2.4599	3.7253**
		(0.567)	(1.466)	(2.012)	(1.313)
ZSCORE_DUM	+	0.0294***	-0.0254	0.0313	0.0574***
		(0.005)	(0.014)	(0.020)	(0.012)
STOCK_RET	+	0.0014	0.1767***	-0.1757***	0.0247*
		(0.005)	(0.014)	(0.019)	(0.012)
ROA	+	0.4005***	2.1562***	0.0159	0.9578***
		(0.040)	(0.103)	(0.146)	(0.092)
LSIZE	+	0.1989***	0.3471***	0.5624***	0.4460***
		(0.002)	(0.005)	(0.008)	(0.005)
SIZE2	-	-0.0000	0.0000**	0.0000	0.0000**
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0099***	-0.0215***	0.0815***	0.0379***
		(0.002)	(0.005)	(0.007)	(0.004)
CASH_SHORTFALL	+	0.1653***	0.5259***	-0.1019	0.2373***
		(0.020)	(0.053)	(0.074)	(0.047)
OPERATING_LOSS	-	-0.0252**	-0.0163	0.0332	-0.0295
		(0.009)	(0.022)	(0.032)	(0.020)
TAX_RATE	0	-0.0022	-0.0069	0.0406*	0.0221
		(0.005)	(0.013)	(0.017)	(0.011)
DIV_CONST	+	0.0018	0.0455***	0.0700***	0.0294**
		(0.005)	(0.013)	(0.017)	(0.011)
ADV_EXPENSE	?	0.9098***	0.4978**	0.8967***	0.7658***
		(0.059)	(0.152)	(0.223)	(0.137)
R&D_EXPENSE	-	0.3953***	-0.2502	1.3844***	1.5324***
		(0.063)	(0.163)	(0.223)	(0.146)
INVEST_EXPENSE	+	-0.1779***	0.3053**	0.9526***	0.4816***
		(0.044)	(0.113)	(0.157)	(0.101)
LEVERAGE	-	0.1364***	0.1472***	-0.2330***	0.0393
		(0.012)	(0.031)	(0.045)	(0.028)
FP_FACTOR	+	-0.0580	-2.3511***	-7.1789***	-3.3208***
		(0.097)	(0.250)	(0.351)	(0.224)

Table 4.7 – Continued

DIV_YIELD	-	-0.0007***	-0.0052***	-0.0050***	-0.0029***
		(0.000)	(0.000)	(0.001)	(0.000)
AGE	+	0.0344***	0.0385***	0.0236*	0.0638***
		(0.002)	(0.006)	(0.010)	(0.005)
AGE2	-	-0.0002***	-0.0002***	-0.0002**	-0.0005***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.0552***	0.0201	0.0578*	0.0803***
		(0.007)	(0.018)	(0.026)	(0.017)
EXECDIR	+	0.4669***	0.5934***	0.9067***	0.7781***
		(0.006)	(0.015)	(0.021)	(0.013)
GENDER	-	0.0119	-0.0313	0.0151	-0.0422
		(0.014)	(0.037)	(0.052)	(0.033)
TURNOVER	?	-0.2368***	-0.1345***	0.4364***	-0.0060
		(0.008)	(0.020)	(0.030)	(0.018)
RATING_DUM	+	0.0331***	-0.0196	0.0699***	0.0382**
		(0.006)	(0.015)	(0.020)	(0.013)
PRESIDENT	+	-0.2057***	5.7939***	-0.5713***	-0.5097***
		(0.017)	(0.044)	(0.061)	(0.039)
CONSTANT		2.9859***	-5.0022***	-0.4624	0.8214***
		(0.081)	(0.210)	(0.323)	(0.188)
Industry		Yes	Yes	Yes	Yes
Year effect		Yes	Yes	Yes	Yes
Observations		24253	24253	18282	24253
Adjusted R^2		0.68	0.89	0.53	0.56

Table 4.7 presents robust regression results for CEOs' salary, bonuses, equity and total compensation. Positive and statistically significant coefficients for *IDIO_RISK* indicate that there is a positive effect of *IDIO_RISK* on all components of CEOs' pay. Firm market performance measure: *STOCK_RET* has a positive effect on CEOs' bonuses and total pay and a negative effect on equity pay, but no effect on CEOs' salary. Accounting performance measure: *ROA* has a positive effect on CEOs' salary, bonuses and total pay but no effect on equity pay. In conclusion, even after controlling for several control variables, robust regression results in Table 4.7 show that *IDIO_RISK* has a positive effect on CEOs' salary, bonuses, equity and total compensation, supporting our H1.

We also control for systematic risk and bankruptcy risk in our estimations. As shown in Table 4.7, *SYS_RISK* is positively related to CEO's total compensation but not related to other components of CEO pay. *ZSCORE_DUM* is positively related to CEO's salary and total compensation but not related to bonus and equity compensation.

Table 4.8 Relationship between CEO Compensation and Idiosyncratic Volatility – Median Regression

This table shows the pooled regression results for executives' salary, bonuses, equity and total compensation. The table presents median regression results. The sample contains 24,253 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.1251***	0.1660**	1.7711***	0.8643***
		(0.018)	(0.059)	(0.065)	(0.043)
SYS_RISK	+	0.3419	0.7259	4.6649*	3.6925*
		(0.668)	(2.141)	(2.346)	(1.563)
ZSCORE_DUM	+	0.1024***	0.1193***	0.1415***	0.1832***
		(0.006)	(0.019)	(0.022)	(0.014)
STOCK_RET	+	-0.0142*	0.3581***	-0.2058***	-0.0043
		(0.006)	(0.020)	(0.023)	(0.015)
ROA	+	0.5324***	3.5141***	0.1650	1.0230***
		(0.046)	(0.148)	(0.170)	(0.108)
LSIZE	+	0.1937***	0.3826***	0.5496***	0.4440***
		(0.002)	(0.008)	(0.009)	(0.006)
SIZE2	-	-0.0000	0.0000***	0.0000**	0.0000***
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0131***	-0.0690***	0.0655***	0.0278***
		(0.002)	(0.007)	(0.008)	(0.005)
CASH_SHORTFALL	+	0.1566***	0.7786***	-0.2283**	0.2630***
		(0.023)	(0.075)	(0.086)	(0.055)
OPERATING_LOSS	-	-0.0286**	-0.0081	0.0658	-0.0098
		(0.010)	(0.033)	(0.038)	(0.024)
TAX_RATE	0	0.0275***	0.0569**	0.1095***	0.0767***
		(0.006)	(0.018)	(0.020)	(0.013)
DIV_CONST	+	0.0351***	0.1390***	0.1196***	0.1014***
		(0.006)	(0.018)	(0.020)	(0.013)
ADV_EXPENSE	?	1.5233***	0.6452**	1.6168***	1.2164***
		(0.064)	(0.205)	(0.242)	(0.150)
R&D_EXPENSE	-	0.2105**	-0.0726	1.4675***	1.3679***
		(0.066)	(0.210)	(0.234)	(0.153)
INVEST_EXPENSE	+	-0.2575***	0.7479***	0.8395***	0.4859***
		(0.051)	(0.162)	(0.184)	(0.119)
LEVERAGE	-	0.0794***	0.0690	-0.4244***	-0.0901**
		(0.014)	(0.045)	(0.053)	(0.033)
FP_FACTOR	+	-0.5372***	-4.5544***	-8.4405***	-4.5279***
		(0.113)	(0.361)	(0.410)	(0.264)
DIV_YIELD	-	-0.0005**	-0.0035***	-0.0062***	-0.0034***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	+	0.0334***	0.0505***	0.0169	0.0591***
		(0.003)	(0.009)	(0.012)	(0.006)
AGE2	-	-0.0002***	-0.0004***	-0.0002	-0.0005***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.0580***	0.0759**	0.0513	0.0732***
		(0.008)	(0.027)	(0.032)	(0.020)

Table 4.8 – Continued

EXECDIR	+	0.4900***	0.6214***	0.9827***	0.8032***
		(0.007)	(0.022)	(0.026)	(0.016)
GENDER	-	0.0460**	-0.0034	0.1425*	0.0548
		(0.017)	(0.054)	(0.062)	(0.040)
TURNOVER	?	-0.2771***	-0.1120***	0.4311***	-0.0261
		(0.009)	(0.030)	(0.036)	(0.022)
RATING_DUM	+	0.0387***	-0.0278	0.0754**	0.0410**
		(0.007)	(0.021)	(0.024)	(0.016)
PRESIDENT	+	-0.1681***	5.3695***	-1.8025***	-0.5537***
		(0.020)	(0.065)	(0.077)	(0.047)
CONSTANT		3.1349***	-5.5422***	1.0346**	1.1171***
		(0.078)	(0.250)	(0.324)	(0.183)
Year effect		Yes	Yes	Yes	Yes
Observations		24253	24253	18282	24253
Pseudo R^2		.38	.29	.30	.32

In Table 4.8, we present estimation results for CEOs' salary, bonuses, equity and total compensation and idiosyncratic risk. This table presents median regression results. The results again confirm our findings that there is a positive effect of *IDIO_RISK* on CEOs' salary, bonuses, equity and total compensation. Again, all of the reported results in median regression suggest that *IDIO_RISK* positively influences CEOs' salary, bonuses, equity and total compensation, supporting H1.

In conclusion, our estimation results show that there is a positive relationship between CEOs' compensation and idiosyncratic risk. Idiosyncratic volatility has a positive effect on CEOs' salary, bonuses, equity and total pay. Our findings are consistent with the findings of Guay (1999), Core and Guay (1999), Prendergast (2000), and Prendergast (2002). However, our test results are different from the findings of Aggrawal and Samrick (1999) and the most recent findings of Jin (2002). They find that firm risk is negatively related to CEOs' pay.

Our estimation results also show that firm characteristics, namely firm *SIZE, GROWTH_OPPORT, CASH_SHORT, OPERAT_LOSS* and *DIV_CONS,* are also important determinants of executive pay. Similarly, firm policy variables and executives' characteristics are other important determinants of CEO pay. Positive and statistically significant coefficients on *CEOs' AGE, DUALITY and EXECDIR* and a negative coefficient on *TURNOVER* confirms that CEOs' characteristics are very important components in executive compensation research.

4.2.3 Relationship between Idiosyncratic Risk and Non-CEO Executive Compensation

In this section, we analyze the effect of idiosyncratic risk on different components of non-CEO executives' compensation. We analyze the effects of idiosyncratic risk on non-CEO executives' salary, bonuses, equity compensation and total compensation separately using OLS, robust and median regression models.

Table 4.9 Relationship between Non-CEO Executive Compensation and Idiosyncratic Volatility – OLS Regression

This table shows the pooled regression results for Non-CEO executives' salary, bonuses, equity and total compensation. The table presents OLS regression results. The sample contains 49,442 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0502**	1.9774***	1.6933***	0.7493***
		(0.016)	(0.111)	(0.095)	(0.036)
SYS_RISK	+	2.2654***	-32.7385***	14.1830***	3.5372***
		(0.525)	(2.785)	(1.700)	(0.995)
ZSCORE_DUM	+	0.0646***	0.1096***	0.1645***	0.1031***
		(0.006)	(0.025)	(0.016)	(0.009)
STOCK_RET	+	0.0007	0.3872***	-0.2235***	-0.0156
		(0.005)	(0.025)	(0.015)	(0.009)
ROA	+	0.3590***	3.8253***	0.2652*	0.7889***
		(0.041)	(0.208)	(0.118)	(0.071)
LSIZE	+	0.1958***	0.3509***	0.5844***	0.4115***
		(0.003)	(0.012)	(0.007)	(0.004)
SIZE2	-	0.0000	0.0000**	0.0000	0.0000*
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0088***	-0.0204*	0.0669***	0.0318***
		(0.002)	(0.010)	(0.008)	(0.004)
CASH_SHORTFALL	+	0.1476***	0.6996***	-0.5218***	0.0547
		(0.024)	(0.098)	(0.061)	(0.035)
OPERATING_LOSS	-	-0.0092	0.1146**	0.1578***	0.0258
		(0.011)	(0.041)	(0.027)	(0.016)
TAX_RATE	0	0.0650***	-0.4190***	0.1943***	0.0947***
		(0.005)	(0.025)	(0.013)	(0.008)
DIV_CONST	+	0.0182***	-0.0417	0.1344***	0.0487***
		(0.005)	(0.026)	(0.015)	(0.008)
ADV_EXPENSE	?	1.4117***	-0.7216*	0.5943**	0.9932***
		(0.069)	(0.298)	(0.213)	(0.103)

Table 4.9 – Continued

R&D_EXPENSE	-	0.3686***	-0.9337***	1.2830***	0.8460***
		(0.066)	(0.264)	(0.145)	(0.095)
INVEST_EXPENSE	+	-0.4572***	1.2062***	0.6368***	0.0897
		(0.043)	(0.215)	(0.127)	(0.069)
LEVERAGE	-	0.0044	0.1853**	-0.4816***	-0.1612***
		(0.012)	(0.058)	(0.038)	(0.019)
FP_FACTOR	+	-0.4913***	-4.9523***	-7.8820***	-3.2966***
		(0.096)	(0.477)	(0.309)	(0.160)
DIV_YIELD	-	0.0001	-0.0035*	-0.0030***	-0.0013***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	+	0.0231***	-0.0054	0.0140	0.0395***
		(0.003)	(0.012)	(0.009)	(0.004)
AGE2	-	-0.0001***	-0.0001	-0.0002*	-0.0004***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.0329***	0.2638***	0.1172***	0.1198***
		(0.005)	(0.025)	(0.013)	(0.008)
EXECDIR	+	0.2268***	0.7410***	0.3778***	0.4111***
		(0.008)	(0.029)	(0.017)	(0.010)
GENDER	-	0.0223**	-0.2870***	-0.0371	-0.0268*
		(0.008)	(0.044)	(0.026)	(0.013)
TURNOVER	?	-0.3270***	-0.2589***	-0.0313	-0.3873***
		(0.007)	(0.027)	(0.021)	(0.011)
RATING_DUM	+	0.0063	0.1651***	-0.0099	0.0010
		(0.006)	(0.029)	(0.017)	(0.009)
PRESIDENT	+	0.1467***	-0.3324***	0.1108***	0.1255***
		(0.005)	(0.024)	(0.014)	(0.008)
CONSTANT		3.1868***	0.5456	0.2171	1.8961***
		(0.081)	(0.319)	(0.240)	(0.112)
Observations		49442	49442	35233	49442
Adjusted R^2		0.41	0.10	0.37	0.44

Table 4.9 presents OLS regression results for non-CEO executives' compensation. Columns three, four, five and six show estimation results for non-CEO executives' salary, bonuses, equity and total compensation, respectively. In all of these specifications, *IDIO_RISK* has positive and statistically significant coefficients. These findings support our main hypothesis that there is a positive effect of *IDIO_RISK* on non-CEO executives' compensation. In these estimations, we also include *SYS_RISK* and *ZSCORE_DUM* to control the effects of systematic risk and bankruptcy risk. Even after controlling for the effect of other risk factors, our regression results show that *IDIO_RISK* has a positive impact on all components of non-CEO executives' compensation. These findings support our main hypothesis.

Table 4.10: Relationship between Non-CEO Executive Compensation and Idiosyncratic Volatility – OLS Regression with Industry and Firm Effects

This table shows the pooled regression results for Non-CEO executives' salary, bonuses, equity and total compensation. The table presents OLS regression results after controlling for industry and year effects. The sample contains 49,442 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0471**	-0.0267	1.4661***	0.5226***
		(0.017)	(0.072)	(0.049)	(0.027)
SYS_RISK	+	-0.8747	-1.9785	4.7645**	0.0247
		(0.521)	(2.241)	(1.499)	(0.834)
ZSCORE_DUM	+	0.0358***	-0.0172	0.1025***	0.0577***
		(0.005)	(0.022)	(0.015)	(0.008)
STOCK_RET	+	-0.0001	0.5146***	-0.1950***	-0.0029
		(0.005)	(0.022)	(0.015)	(0.008)
ROA	+	0.2459***	4.5194***	0.1831	0.6936***
		(0.039)	(0.167)	(0.113)	(0.062)
LSIZE	+	0.1855***	0.4606***	0.5617***	0.3998***
		(0.002)	(0.009)	(0.006)	(0.003)
GROWTH_OPPORT	+	-0.0091***	-0.0331***	0.0599***	0.0288***
		(0.002)	(0.008)	(0.005)	(0.003)
CASH_SHORTFALL	+	0.1692***	0.8807***	-0.3274***	0.1365***
		(0.020)	(0.087)	(0.059)	(0.032)
OPERATING_LOSS	-	-0.0086	0.0367	0.1493***	0.0123
		(0.008)	(0.036)	(0.025)	(0.014)
TAX_RATE	0	0.0073	-0.0049	0.0618***	0.0288***
		(0.005)	(0.021)	(0.014)	(0.008)
DIV_CONST	+	-0.0010	0.0475*	0.0888***	0.0122
		(0.005)	(0.021)	(0.014)	(0.008)
ADV_EXPENSE	?	0.7390***	0.1123	0.2291	0.5841***
		(0.058)	(0.252)	(0.179)	(0.094)
R&D_EXPENSE	-	0.3898***	0.1892	1.4321***	1.0396***
		(0.059)	(0.255)	(0.168)	(0.095)
INVEST_EXPENSE	+	-0.1903***	1.0102***	0.8140***	0.2738***
		(0.043)	(0.187)	(0.125)	(0.070)
LEVERAGE	-	0.0786***	-0.0079	-0.3073***	-0.0729***
		(0.012)	(0.050)	(0.034)	(0.019)
FP_FACTOR	+	-0.4434***	-2.3794***	-7.4326***	-2.9146***
		(0.093)	(0.402)	(0.273)	(0.150)
DIV_YIELD	-	-0.0001	-0.0026***	-0.0032***	-0.0015***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	+	0.0211***	0.0502***	0.0204**	0.0434***
		(0.002)	(0.009)	(0.007)	(0.003)
AGE2	-	-0.0001***	-0.0006***	-0.0003***	-0.0004***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.0380***	0.1361***	0.1118***	0.1135***
		(0.005)	(0.021)	(0.013)	(0.008)
EXECDIR	+	0.2547***	0.2709***	0.4923***	0.4313***
		(0.006)	(0.025)	(0.016)	(0.009)

Table 4.10 – Continued

GENDER	-	-0.0054	-0.0684	-0.0934***	-0.0429**
		(0.009)	(0.037)	(0.024)	(0.014)
TURNOVER	?	-0.3434***	-0.1420***	0.0313	-0.3621***
		(0.006)	(0.025)	(0.018)	(0.009)
RATING_DUM	+	0.0470***	-0.2042***	0.0818***	0.0383***
		(0.006)	(0.025)	(0.016)	(0.009)
PRESIDENT	+	0.3044***	-0.1256	-0.1050	0.1876***
		(0.016)	(0.070)	(0.055)	(0.026)
CONSTANT		3.1654***	0.1261	-0.2139	1.5362***
		(0.074)	(0.318)	(0.260)	(0.118)
Industry effect		Yes	Yes	Yes	Yes
Firm effect		Yes	Yes	Yes	Yes
Observations		49442	49442	35233	49442
Adjusted R^2		0.46	0.38	0.41	0.47

In Table 4.10, we present OLS regression results for non-CEO executives' compensation. As a robustness check, we repeat Table 4.9 by adding industry and year effect in our models. Even after controlling for industry and firm effect, except for bonuses all of the reported results suggest that *IDIO_RISK* positively influences non-CEO executives' salary, equity and total compensation. Again, these results support our H1.

Table 4.11 Relationship between Non-CEO Executive Compensation and Idiosyncratic Volatility – Robust Regression

This table shows the pooled regression results for Non-CEO executives' salary, bonuses, equity and total compensation. The table presents OLS regression results after controlling for industry and year effects. The sample contains 49,442 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0721***	0.1471***	1.6327***	0.5435***
		(0.011)	(0.030)	(0.041)	(0.024)
SYS_RISK	+	-1.0528**	-2.1169*	2.1295	-0.1892
		(0.335)	(0.921)	(1.266)	(0.750)
ZSCORE_DUM	+	0.0219***	-0.0311***	0.0794***	0.0501***
		(0.003)	(0.009)	(0.013)	(0.007)
STOCK_RET	+	-0.0006	0.1393***	-0.2153***	0.0015
		(0.003)	(0.009)	(0.013)	(0.007)
ROA	+	0.1509***	1.6199***	0.0497	0.7791***
		(0.025)	(0.069)	(0.096)	(0.056)
LSIZE	+	0.1905***	0.3197***	0.5598***	0.4033***
		(0.001)	(0.004)	(0.005)	(0.003)
SIZE2	-	-0.0000	0.0000*	0.0000	0.0000**
		(0.000)	(0.000)	(0.000)	(0.000)

Table 4.11 – Continued

GROWTH_OPPORT	+	-0.0036**	-0.0040	0.0792***	0.0289***
		(0.001)	(0.003)	(0.004)	(0.003)
CASH_SHORTFALL	+	0.1266***	0.4118***	-0.3204***	0.1230***
		(0.013)	(0.036)	(0.050)	(0.029)
OPERATING_LOSS	-	-0.0004	-0.0051	0.1111***	0.0298*
		(0.005)	(0.015)	(0.021)	(0.012)
TAX_RATE	0	0.0061*	0.0042	0.0601***	0.0336***
		(0.003)	(0.008)	(0.011)	(0.007)
DIV_CONST	+	0.0027	0.0502***	0.0779***	0.0071
		(0.003)	(0.009)	(0.012)	(0.007)
ADV_EXPENSE	?	0.7735***	0.5952***	0.4244**	0.7141***
		(0.038)	(0.103)	(0.151)	(0.084)
R&D_EXPENSE	-	0.5459***	0.0917	1.2561***	1.2413***
		(0.038)	(0.105)	(0.142)	(0.085)
INVEST_EXPENSE	+	-0.2663***	0.2560***	0.8657***	0.2661***
		(0.028)	(0.077)	(0.105)	(0.063)
LEVERAGE	-	0.0589***	0.1197***	-0.3213***	-0.0827***
		(0.007)	(0.020)	(0.029)	(0.017)
FP_FACTOR	+	-0.2420***	-2.0111***	-6.8992***	-2.7935***
		(0.060)	(0.165)	(0.231)	(0.135)
DIV_YIELD	-	-0.0002	-0.0046***	-0.0035***	-0.0016***
		(0.000)	(0.000)	(0.000)	(0.000)
AGE	+	0.0195***	0.0143***	0.0147*	0.0451***
		(0.001)	(0.004)	(0.006)	(0.003)
AGE2	-	-0.0001***	-0.0001*	-0.0002***	-0.0004***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.0433***	0.0555***	0.0966***	0.1159***
		(0.003)	(0.008)	(0.011)	(0.007)
EXECDIR	+	0.2781***	0.4226***	0.4974***	0.4182***
		(0.004)	(0.010)	(0.014)	(0.008)
GENDER	-	-0.0301***	-0.0756***	-0.0795***	-0.0641***
		(0.005)	(0.015)	(0.021)	(0.012)
TURNOVER	?	-0.1991***	-0.1595***	0.0769***	-0.3376***
		(0.004)	(0.010)	(0.016)	(0.008)
RATING_DUM	+	0.0395***	-0.0236*	0.0539***	0.0326***
		(0.004)	(0.010)	(0.014)	(0.008)
PRESIDENT	+	0.1714***	0.0892**	-0.1390**	0.1636***
		(0.010)	(0.029)	(0.046)	(0.023)
CONSTANT	?	3.1731***	1.4958***	-0.1411	1.4124***
		(0.048)	(0.131)	(0.219)	(0.106)
Industry effect		Yes	Yes	Yes	Yes
Industry		Yes	Yes	Yes	Yes
Observations		49442	49442	35233	49442
Adjusted R^2		0.65	0.89	0.50	0.53

In Table 4.11, we present robust regression results for non-CEO executives' salary, bonuses, equity and total compensation. As a robustness check, we repeat the analysis in Table

4.10 using robust regression analysis. Again our regression results reflect the finding in Table 4.9 confirming our hypothesis that there is a positive effect of *IDIO_RISK* on executives' salary, bonuses, equity and total compensation. Even after controlling for industry and year effect in our robust regression, the estimated coefficients of *IDIO_RISK* are positive and statistically significant at one percent significance level. Again, these findings support our main hypothesis.

Table 4.12 Relationship between Non-CEO Executive Compensation and Idiosyncratic Volatility – Median Regression

This table shows the pooled regression results for Non-CEO executives' salary, bonuses, equity and total compensation. The table presents OLS regression results after controlling for industry and year effects. The sample contains 49,442 firm-year observations, and covers the period 1992 to 2009. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.1653***	0.1411***	1.7819***	0.7560***
		(0.012)	(0.037)	(0.044)	(0.025)
SYS_RISK	+	-1.8075***	2.1999	1.6509	0.4756
		(0.368)	(1.175)	(1.381)	(0.793)
ZSCORE_DUM	+	0.0678***	0.0262*	0.1605***	0.1185***
		(0.004)	(0.011)	(0.013)	(0.008)
STOCK_RET	+	-0.0146***	0.2347***	-0.2503***	-0.0251**
		(0.004)	(0.012)	(0.014)	(0.008)
ROA	+	0.2260***	2.5277***	-0.0823	0.8785***
		(0.027)	(0.086)	(0.103)	(0.059)
LSIZE	+	0.1890***	0.3471***	0.5498***	0.4060***
		(0.001)	(0.005)	(0.006)	(0.003)
SIZE2	-	0.0000	0.0000***	0.0000***	0.0000***
		(0.000)	(0.000)	(0.000)	(0.000)
GROWTH_OPPORT	+	-0.0033**	-0.0268***	0.0734***	0.0318***
		(0.001)	(0.004)	(0.005)	(0.003)
CASH_SHORTFALL	+	0.0944***	0.5618***	-0.4712***	0.0526
		(0.014)	(0.044)	(0.053)	(0.030)
OPERATING_LOSS	-	0.0020	-0.0067	0.1656***	0.0622***
		(0.006)	(0.019)	(0.023)	(0.013)
TAX_RATE	0	0.0315***	0.0406***	0.1247***	0.0832***
		(0.003)	(0.011)	(0.012)	(0.007)
DIV_CONST	+	0.0243***	0.1087***	0.1332***	0.0527***
		(0.003)	(0.011)	(0.013)	(0.008)
ADV_EXPENSE	?	1.4859***	0.9069***	0.8261***	1.0909***
		(0.038)	(0.122)	(0.150)	(0.083)
R&D_EXPENSE	-	0.5529***	0.2749*	1.1758***	1.0983***
		(0.037)	(0.119)	(0.138)	(0.081)
INVEST_EXPENSE	+	-0.3970***	0.2731**	0.7242***	0.1211
		(0.030)	(0.096)	(0.113)	(0.065)
LEVERAGE	-	0.0197*	-0.0012	-0.5225***	-0.1911***
		(0.008)	(0.025)	(0.031)	(0.017)

Table 4.12 – Continued

FP_FACTOR	+	-0.5358***	-2.8305***	-7.9247***	-3.3431***
		(0.065)	(0.209)	(0.251)	(0.141)
DIV_YIELD	-	-0.0001	-0.0018***	-0.0036***	-0.0014***
		(0.000)	(0.000)	(0.001)	(0.000)
AGE	+	0.0190***	0.0427***	0.0174*	0.0431***
		(0.002)	(0.005)	(0.007)	(0.003)
AGE2	-	-0.0001***	-0.0004***	-0.0003***	-0.0004***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	+	0.0467***	0.0917***	0.1087***	0.1210***
		(0.003)	(0.011)	(0.012)	(0.007)
EXECDIR	+	0.2894***	0.3768***	0.4809***	0.4289***
		(0.004)	(0.013)	(0.015)	(0.009)
GENDER	-	-0.0178**	-0.0955***	-0.0726**	-0.0673***
		(0.006)	(0.019)	(0.023)	(0.013)
TURNOVER	?	-0.2164***	-0.1497***	0.0554**	-0.3640***
		(0.004)	(0.013)	(0.017)	(0.009)
RATING_DUM	+	0.0252***	-0.0649***	0.0386*	0.0192*
		(0.004)	(0.013)	(0.015)	(0.009)
PRESIDENT	+	0.2037***	0.1721***	-0.3867***	0.2636***
		(0.012)	(0.038)	(0.051)	(0.026)
CONSTANT		3.1922***	0.4753***	0.1899	1.5568***
		(0.042)	(0.136)	(0.184)	(0.092)
Year effect		Yes	Yes	Yes	Yes
Observations		49442	49442	35233	49442
Pseudo R^2		.36	.34	.27	.30

In Table 4.12, we present median regression results for non-CEO executives' total compensation. As a robustness check, we repeat the analysis in Table 4.11 using median regression. Again our main findings remain unchanged. *IDIO_RISK* has positive and statistically significant coefficients in all specifications. Thus, all of the reported results suggest that *IDIO_RISK* influences non-CEO executives' salary, bonuses, equity and total compensation positively, supporting H1. Estimation results also show that *ZSCORE_DUM* is another important determinant of executives' compensation. Positive and statistically significant coefficients of *ZSCORE_DUM* in all specifications in indicate that bankruptcy risk is positively associated with executive salary, bonus, equity and total compensation.

In conclusion, we estimated the effect of *IDIO_RISK* on non-CEO executives' salary, bonuses, equity and total compensation using several regression models. In all estimations, we find consistent results. In other words, our regression results show that *IDIO_RISK* has a positive influence on non-CEO executives' salary, bonuses, equity and total compensation, supporting H1.

4.3 Relationship between Idiosyncratic Risk Executive Compensation – Robustness Check

In this section, we repeat our analysis using sub-samples, excluding regulated firms, and using rank idiosyncratic risk to check the robustness of our results. However, for brevity we report only estimation results for CEOs' salary, bonuses, equity and total compensation.

4.3.1 Sub-sample study

In this section, we repeat our analysis using sub-samples. To check the robustness of our results, we divide our sample into two groups based on summary statistics. Summary statistics show that there are significant changes in executives' pay patterns after 2000. Therefore, we subdivide our sample into 1992-2000 and 2001-2009 groups.

Table 4.13 Relationship between CEO Compensation and Idiosyncratic Volatility – Subsample Regressions

This table shows the OLS regression results for CEOs' salary, bonuses, equity and total compensation. The Panel A sample contains 13,112 firm-year observations, and covers the period 1992 to 2000. The Panel B presents OLS regression results for group two. The Panel B sample contains 13,131 firm-year observations, and covers the period 1992 to 2000. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Panel A: Relationship between CEO Compensation and Idiosyncratic Risk - 1992 to 2000

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.1214**	-0.3230	1.6572***	0.8472***
		(0.041)	(0.177)	(0.303)	(0.110)
SYS_RISK	+	2.8957	8.3049	35.0562***	19.5835***
		(1.658)	(6.357)	(4.539)	(2.443)
ZSCORE_DUM	+	0.0463***	0.0825	-0.0183	0.0597**
		(0.013)	(0.053)	(0.036)	(0.021)
STOCK_RET	+	0.0318*	0.8713***	-0.1643***	0.0482*
		(0.014)	(0.047)	(0.030)	(0.020)
ROA	+	0.6499***	7.1069***	-0.4393	0.7769***
		(0.087)	(0.364)	(0.252)	(0.157)
LSIZE	+	0.2128***	0.5939***	0.5544***	0.4428***
		(0.005)	(0.020)	(0.016)	(0.009)
GROWTH_OPPORT	-	-0.0081*	-0.0702***	0.0770***	0.0363***
		(0.003)	(0.015)	(0.018)	(0.008)
CASH_SHORTFALL	+	0.2713***	1.6405***	-0.1167	0.3804***
		(0.057)	(0.191)	(0.114)	(0.075)
OPERATING_LOSS	+	-0.0717*	-0.0737	0.0120	-0.1414***
		(0.029)	(0.079)	(0.053)	(0.037)

Table 4.13 – Continued

TAX_RATE	-	0.0229	-0.1142*	0.1073***	0.0627**
		(0.012)	(0.051)	(0.032)	(0.020)
DIV_CONST	0	0.0073	0.0258	0.0910**	0.0165
		(0.011)	(0.046)	(0.031)	(0.018)
ADV_EXPENSE	+	0.7400***	-1.1206	1.2148***	0.7843***
		(0.127)	(0.594)	(0.347)	(0.209)
R&D_EXPENSE	?	0.4122**	-0.7651	0.9839**	0.8650***
		(0.130)	(0.548)	(0.331)	(0.253)
INVEST_EXPENSE	-	0.0961	1.7434***	1.4439***	0.4478**
		(0.092)	(0.409)	(0.249)	(0.157)
LEVERAGE	+	0.1318***	-0.0041	-0.0449	0.1618***
		(0.030)	(0.129)	(0.082)	(0.048)
FP_FACTOR	-	0.0960	-4.1008***	-9.2591***	-3.6000***
		(0.254)	(0.933)	(0.663)	(0.372)
DIV_YIELD	+	-0.0009	-0.0087***	-0.0108***	-0.0039**
		(0.001)	(0.002)	(0.002)	(0.001)
AGE	-	0.0482***	0.1444***	0.0461**	0.0884***
		(0.005)	(0.022)	(0.015)	(0.009)
AGE2	+	-0.0003***	-0.0014***	-0.0005**	-0.0007***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	-	0.0702*	0.2316**	0.0413	0.1229***
		(0.029)	(0.081)	(0.052)	(0.037)
EXECDIR	+	0.4168***	0.3876***	0.8998***	0.7590***
		(0.014)	(0.049)	(0.036)	(0.021)
GENDER	+	-0.0088	0.0485	0.1377	-0.0427
		(0.046)	(0.163)	(0.155)	(0.078)
TURNOVER	-	-0.3827***	-0.3143***	0.4165***	-0.1201***
		(0.027)	(0.072)	(0.060)	(0.036)
RATING_DUM	?	0.0171	-0.1481**	0.0643*	0.0220
		(0.012)	(0.050)	(0.032)	(0.019)
PRESIDENT	+	0.3306***	0.0425	-0.9423***	-0.1592***
		(0.031)	(0.097)	(0.078)	(0.042)
CONSTANT		2.0457***	-3.8630***	-0.9023	-0.1489
		(0.152)	(0.680)	(0.520)	(0.283)
Industry		Yes	Yes	Yes	Yes
Observations		13122	13122	9397	13122
Adjusted R^2		0.41	0.21	0.44	0.48
Panel B: Relationship between CEO Compensation and Idiosyncratic Risk - 2001 to 2009					
Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.0995	2.7190***	0.7819***	0.5679***
		(0.052)	(0.194)	(0.082)	(0.062)
SYS_RISK	+	-5.5318**	-3.0005	12.9096***	0.7198
		(1.682)	(6.278)	(2.716)	(2.002)
ZSCORE_DUM	+	0.0654***	-0.0068	0.0010	0.1058***
		(0.019)	(0.070)	(0.031)	(0.022)
STOCK_RET	+	-0.0184	0.9440***	-0.1959***	-0.0399
		(0.019)	(0.070)	(0.031)	(0.022)
ROA	+	0.9472***	4.0121***	1.0065***	1.4715***
		(0.155)	(0.580)	(0.257)	(0.185)

Table 4.13 – Continued

LSIZE	+	0.1356***	0.4309***	0.6099***	0.4387***
		(0.007)	(0.028)	(0.012)	(0.009)
GROWTH_OPPORT	-	-0.1050***	-0.1329**	0.0682***	-0.0492***
		(0.012)	(0.046)	(0.021)	(0.015)
CASH_SHORTFALL	+	0.1029	-0.0309	-0.2645*	-0.0478
		(0.076)	(0.285)	(0.124)	(0.091)
OPERATING_LOSS	+	-0.0838*	0.1721	0.1469**	-0.0199
		(0.034)	(0.125)	(0.055)	(0.040)
TAX_RATE	-	0.0544***	-0.2607***	0.0717**	0.0315
		(0.016)	(0.061)	(0.026)	(0.019)
DIV_CONST	0	-0.0009	-0.2173***	0.0483	-0.0090
		(0.017)	(0.064)	(0.027)	(0.020)
ADV_EXPENSE	+	0.7163**	-1.3046	1.2727***	0.3695
		(0.218)	(0.815)	(0.379)	(0.260)
R&D_EXPENSE	?	0.2698	-1.7024	1.9803***	1.6974***
		(0.244)	(0.909)	(0.384)	(0.290)
INVEST_EXPENSE	-	-0.1572	-0.1593	0.6296*	0.4787*
		(0.161)	(0.603)	(0.259)	(0.192)
LEVERAGE	+	0.2688***	-0.1519	-0.4530***	-0.0191
		(0.041)	(0.154)	(0.071)	(0.049)
FP_FACTOR	-	-1.2805***	-4.3086**	-5.5431***	-3.8863***
		(0.388)	(1.449)	(0.644)	(0.462)
DIV_YIELD	+	0.0006	-0.0025	-0.0044***	-0.0022***
		(0.000)	(0.002)	(0.001)	(0.000)
AGE	-	0.0274**	-0.0614	0.0277	0.0422***
		(0.009)	(0.035)	(0.017)	(0.011)
AGE2	+	-0.0002*	0.0005	-0.0003	-0.0004***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	-	0.1581***	0.5408***	-0.0263	0.1971***
		(0.022)	(0.083)	(0.037)	(0.027)
EXECDIR	+	0.4216***	0.1322	0.9546***	0.7629***
		(0.021)	(0.078)	(0.034)	(0.025)
GENDER	+	0.0189	-0.3409*	-0.0190	0.0020
		(0.044)	(0.162)	(0.069)	(0.052)
TURNOVER	-	-0.3885***	-0.2005	0.2994***	0.0118
		(0.029)	(0.108)	(0.047)	(0.035)
RATING_DUM	?	0.0569**	0.1106	0.0871**	0.0952***
		(0.021)	(0.078)	(0.033)	(0.025)
PRESIDENT	+	-0.1405***	2.9410***	-0.0176	0.1242***
		(0.028)	(0.106)	(0.044)	(0.034)
CONSTANT	+	3.6096***	-0.9900	-0.3636	1.3547***
		(0.319)	(1.191)	(0.597)	(0.380)
Industry		Yes	Yes	Yes	Yes
Observations		11131	11131	8885	11131
Adjusted R^2		0.21	0.15	0.41	0.38

Table 4.13 presents OLS regression results. Panel A presents regression results for the 1992-2000 samples. *IDIO_RISK* has positive and statistically significant results for CEOs'

salary, equity and total compensation, supporting our main findings in earlier tests. However, *IDIO_RISK* remains insignificant indicating that *IDIO_RISK* has no effect on CEOs' bonus pay. Panel B presents OLS regression results for the 2001-2009 samples. Test results show that CEOs' bonuses, equity and total pay are positively related to *IDIO_RISK* and *IDIO_RISK* has no effect on CEOs' salary. Overall, in our sub-sample study our results remain valid and support our prediction that there is a positive effect of idiosyncratic volatility on CEOs' compensation. Thus, our sub-sample study also reconfirms our earlier findings that there is a positive relationship between CEOs' compensation and *IDIO_RISK.*

4.3.2 Sample Excluding Regulated Firms

Prior research on executive compensation excludes regulated firms, namely insurance, financial, gas and utilities. Following the prior convention, we also exclude these regulated firms from our sample and repeat our test for CEOs' salary, bonuses, equity and total compensation.

Table 4.14 Relationship between CEO Compensation and Idiosyncratic Volatility – Excluding Regulated Firms

This table shows the OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample excludes regulated firms. The sample contains 22,382 firm-year observations, and covers the period 1992 to 2000. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.0329	1.4222***	1.2093***	0.7169***
		(0.034)	(0.128)	(0.063)	(0.043)
SYS_RISK	+	0.4342	-31.1601***	25.2001***	8.4252***
		(1.114)	(4.256)	(2.121)	(1.441)
ZSCORE_DUM	+	0.0631***	0.0858	-0.0308	0.0837***
		(0.012)	(0.047)	(0.024)	(0.016)
STOCK_RET	+	0.0292**	0.6821***	-0.1696***	0.0068
		(0.011)	(0.043)	(0.022)	(0.014)
ROA	+	0.6388***	5.3435***	0.2969	1.0208***
		(0.086)	(0.330)	(0.171)	(0.112)
LSIZE	+	0.1738***	0.4375***	0.5841***	0.4413***
		(0.005)	(0.018)	(0.009)	(0.006)
GROWTH_OPPORT	-	-0.0178***	-0.0506**	0.0795***	0.0283***
		(0.004)	(0.016)	(0.008)	(0.005)
CASH_SHORTFALL	+	0.1788***	1.0477***	-0.1769*	0.2280***
		(0.045)	(0.171)	(0.087)	(0.058)
OPERATING_LOSS	+	-0.0931***	0.0396	0.0717	-0.0966***
		(0.019)	(0.073)	(0.038)	(0.025)

Table 4.14 – Continued

TAX_RATE	-	0.0539***	-0.4609***	0.1463***	0.0615***
		(0.011)	(0.040)	(0.020)	(0.014)
DIV_CONST	0	-0.0177	-0.0423	0.0407	-0.0176
		(0.011)	(0.042)	(0.021)	(0.014)
ADV_EXPENSE	+	0.7156***	-1.0379*	0.8877***	0.4700**
		(0.128)	(0.489)	(0.261)	(0.165)
R&D_EXPENSE	?	0.3969**	-0.5015	1.2437***	1.1507***
		(0.137)	(0.523)	(0.260)	(0.177)
INVEST_EXPENSE	-	-0.1662	2.0332***	0.8932***	0.4267***
		(0.096)	(0.368)	(0.186)	(0.125)
LEVERAGE	+	0.1801***	0.1947	-0.2932***	0.0424
		(0.026)	(0.100)	(0.053)	(0.034)
FP_FACTOR	-	0.3168	-5.6216***	-7.1623***	-3.1104***
		(0.209)	(0.800)	(0.410)	(0.271)
DIV_YIELD	+	0.0003	-0.0059***	-0.0030***	-0.0018***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	-	0.0434***	0.0600**	0.0461***	0.0767***
		(0.005)	(0.019)	(0.012)	(0.007)
AGE2	+	-0.0003***	-0.0006***	-0.0005***	-0.0007***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	-	0.1099***	0.7099***	-0.0762*	0.1592***
		(0.016)	(0.060)	(0.032)	(0.020)
EXECDIR	+	0.4146***	0.2055***	0.8971***	0.7507***
		(0.013)	(0.050)	(0.026)	(0.017)
GENDER	+	0.0212	-0.4399***	0.1200	0.0007
		(0.032)	(0.122)	(0.063)	(0.041)
TURNOVER	-	-0.3547***	-0.0336	0.0147	-0.2002***
		(0.015)	(0.058)	(0.031)	(0.020)
RATING_DUM	?	0.0455***	0.1539**	0.0452	0.0583***
		(0.013)	(0.049)	(0.025)	(0.017)
PRESIDENT	+	0.1795***	-0.4027***	0.2480***	0.1874***
		(0.010)	(0.038)	(0.019)	(0.013)
CONSTANT	+	2.5375***	-1.5496*	-0.8184*	0.2789
		(0.177)	(0.676)	(0.383)	(0.229)
Industry		Yes	Yes	Yes	Yes
Observations		22382	22382	16971	22382
Adjusted R^2		0.30	0.11	0.43	0.44

Table 4.14 presents OLS regression results. Even after excluding regulated firms from our sample, the coefficient for *IDIO_RISK* remains positive and statistically significant for CEOs' bonuses, equity and total compensation, supporting our main findings. However, test results do not show any significant relationship between CEOs' salary compensation and idiosyncratic risk. Overall, our test results support our main hypothesis that there is a positive relationship between executive pay and idiosyncratic risk.

4.3.3 Rank Risk as a Measure of Idiosyncratic Volatility

Following Aggarwal and Samwick (1999), and Jin (2002), we replace *IDIO_RISK* and *SYS_RISK* with *RANK_IVOL* and *RANK_SYSRISK* to test our main prediction that there is a positive relationship between *IDIO_RISK* and CEO compensation. When we substitute *IDIO_RISK* with *RANK_IVOL,* we do not find different results. Our results remain unchanged when we use rank idiosyncratic risk instead of idiosyncratic risk.

Table 4.15 Relationship between CEO Pay and Idiosyncratic Volatility – Rank Risk

This table shows the OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample contains 24,253 firm-year observations, and covers the period 1992 to 2000. Heteroscedasticity corrected robust standard errors are reported for all models. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively. All variables are defined in Appendix A.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
RANK_IVOL	+	-0.0003	0.0115***	0.0119***	0.0059***
		(0.000)	(0.001)	(0.000)	(0.000)
RANK_SYSRISK	+	0.0001	-0.0018**	0.0039***	0.0017***
		(0.000)	(0.001)	(0.000)	(0.000)
ZSCORE_DUM	+	0.0586***	0.1135*	0.0460*	0.1068***
		(0.014)	(0.045)	(0.023)	(0.017)
STOCK_RET	+	0.0318**	0.6665***	-0.1816***	0.0048
		(0.012)	(0.043)	(0.022)	(0.016)
ROA	+	0.6367***	5.7011***	0.4562*	1.0711***
		(0.080)	(0.339)	(0.178)	(0.124)
LSIZE	+	0.1796***	0.4709***	0.6211***	0.4590***
		(0.008)	(0.019)	(0.009)	(0.008)
GROWTH_OPPORT	-	-0.0175***	-0.0602***	0.0736***	0.0257***
		(0.005)	(0.014)	(0.013)	(0.008)
CASH_SHORTFALL	+	0.1655**	1.1798***	-0.0213	0.2806***
		(0.057)	(0.167)	(0.087)	(0.060)
OPERATING_LOSS	+	-0.0872**	0.0585	0.0790*	-0.0780**
		(0.027)	(0.068)	(0.038)	(0.030)
TAX_RATE	-	0.0525***	-0.4776***	0.1245***	0.0493***
		(0.011)	(0.042)	(0.020)	(0.014)
DIV_CONST	0	-0.0048	-0.0942*	0.0210	-0.0188
		(0.010)	(0.041)	(0.020)	(0.013)
ADV_EXPENSE	+	0.7274***	-1.1012*	0.8009**	0.4543*
		(0.119)	(0.519)	(0.247)	(0.183)
R&D_EXPENSE	?	0.4089***	-0.8339	0.9209***	1.0000***
		(0.124)	(0.521)	(0.244)	(0.198)
INVEST_EXPENSE	-	-0.1527	2.1577***	1.0340***	0.5082***
		(0.083)	(0.359)	(0.184)	(0.114)
LEVERAGE	+	0.1854***	0.2213*	-0.2916***	0.0575
		(0.029)	(0.110)	(0.053)	(0.039)
FP_FACTOR	-	0.3257	-6.1449***	-7.7599***	-3.4610***
		(0.228)	(0.798)	(0.463)	(0.292)

Table 4.15 – Continued

DIV_YIELD	+	0.0003	-0.0057*	-0.0034***	-0.0019***
		(0.000)	(0.003)	(0.001)	(0.000)
AGE	-	0.0451***	0.0613**	0.0402***	0.0741***
		(0.005)	(0.020)	(0.011)	(0.007)
AGE2	+	-0.0003***	-0.0006***	-0.0004***	-0.0006***
		(0.000)	(0.000)	(0.000)	(0.000)
DUALITY	-	0.1035***	0.7617***	-0.0419	0.1642***
		(0.023)	(0.064)	(0.029)	(0.028)
EXECDIR	+	0.4253***	0.2097***	0.8925***	0.7500***
		(0.012)	(0.044)	(0.025)	(0.017)
GENDER	+	0.0282	-0.3232*	0.1477*	0.0330
		(0.023)	(0.130)	(0.058)	(0.039)
TURNOVER	-	-0.3538***	-0.0029	0.0080	-0.2084***
		(0.015)	(0.051)	(0.035)	(0.022)
RATING_DUM	?	0.0327*	0.1204**	0.0529*	0.0490**
		(0.015)	(0.047)	(0.024)	(0.017)
PRESIDENT	+	0.1830***	-0.4107***	0.2508***	0.1946***
		(0.010)	(0.038)	(0.019)	(0.013)
CONSTANT	+	2.4308***	-1.9228**	-1.3087**	0.0709
		(0.158)	(0.625)	(0.422)	(0.230)
Industry		Yes	Yes	Yes	Yes
Observations		24253	24253	18282	24253
Adjusted R^2		0.31	0.11	0.45	0.45

In Table 4.15 we present our test results. Even after replacing *IDIO_RISK* with rank measure of risk, test results are pretty much the same. Positive and statistically significant coefficients for IDIO_*RANKRISK* in CEOs' bonuses, equity and total pay regression indicate a positive relationship between idiosyncratic risk and CEO pay. Although the test results do not show a statistically significant relationship between CEOs' salary compensation and *IDIO_RANKRISK*, overall our test results support our main hypothesis that there is a positive relationship between *IDIO_RISK* and CEOs' compensation.

4.4 Idiosyncratic Risk and CEO Pay in Regulated and Non-Regulated Firms

We study the impact of idiosyncratic risk on CEO compensation in two subsets of our sample: regulated and non-regulated firms. Following Demsetz and Lehn (1985), Smith and Watts (1992) and Yermack (1995), we define regulated firms as firms in financial, insurance and utility industries. Smith and Watts (1992) identify the utility, banking, and insurance industries as heavily regulated.

We examine whether the impact of idiosyncratic risk on CEO pay is different between regulated and non-regulated firms for three reasons. First, executives in highly regulated firms will receive lower incentives since the reduced range of managerial discretion in these firms diminishes the consequences of good or bad decisions (Demsetz and Lehn, 1985; Smith and Watts, 1992). Second, employees in non-regulated firms are more entrenched than in regulated firms; and, therefore, we expect the impact of idiosyncratic risk on CEOs' pay in regulated firms to be greater than in non-regulated firms. Finally, regulated firms have different pay practices from non-regulated firms.[33]

First, we compare executives' compensation and the explanatory variables between regulated and non-regulated firms. We first compare descriptive statistics between these two groups of samples. Second, we estimate the effect of *IDIO_RISK* separately on these two groups of samples and compare the estimated coefficient of *IDIO_RISK* on these two groups using the Wald test to find whether or not the estimated coefficient for *IDIO_RISK* is statistically different in the two groups of samples. Finally, we use a dummy variable approach to test whether or not *IDIO_RISK* has a differential impact on CEOs' pay in regulated and non-regulated firms.

Table 4.16 provides a summary of variables used in the analysis of impact of idiosyncratic risk on CEOs' compensation in regulated and non-regulated firms. The sample contains 22,382 CEOs in non-regulated firms and 1,871 CEOs in regulated firms. On average, all components of CEOs' compensation in non-regulated firms are higher than those in regulated firms. For example, the average salary (bonus) difference is 61.66 (208.3) thousand and the difference is statistically significant. Similarly, on average, CEOs in non-regulated firms receive 1,420.2 (1,652.8) thousand more equity (total) compensation than CEOs in regulated firms. Moreover, there are statistically significant differences in both return and risk characteristics in these two groups of firms. For instance, the average stock return in non-

33 For example, Demsetz and Lehn (1985) and Smith and Watts (1992) document that grants of stock and options in regulated firms are lower than in non-regulated firms.

regulated (regulated) firms is 10.15% (5.34%) and the difference is statistically significant. The average idiosyncratic risk in non-regulated (regulated) firms is 35.9% (16.1%), which is statistically different. This evidence indicates the significant differences between the regulated and non-regulated firms' samples.

Table 4.16 Comparison of Average CEO Pay in Regulated and Non-regulated Firms: Univariate Tests

This table shows the summary statistics for our dependent and right-hand side variables in the regulated firms CEOs' compensation analysis. The sample contains 22,382 observations for non-regulated firms and 1871 observations for regulated firms, and the sample covers the period 1992 to 2009. All variables are defined in Appendix A. Difference is the average difference between non-regulated and regulated firms for the given variables. Test statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	N	Non-Regulated Firms	N	Regulated Firms	Average Difference	t-stat
SALARY	22382	567.76	1871	506.09	61.66***	(7.33)
BONUS	22382	502.33	1871	294.03	208.3***	(8.56)
EQUITY_COMP	22355	2207.9	1867	787.69	1420.2***	(6.91)
TOTAL_COMP	22382	3545.8	1871	1892.9	1652.8***	(7.62)
IDIO_RISK	22382	0.3509	1871	0.1902	0.161***	(39.85)
SYS_RISK	22382	0.00274	1871	0.000859	0.0019***	(18.43)
ZSCORE_DUM	22382	0.8021	1871	0.3640	0.438***	(44.91)
STOCK_RET	22382	0.1015	1871	0.04811	0.0534***	(5.26)
ROA	22382	0.1195	1871	0.07182	0.0477***	(27.19)
LSIZE	22382	7.2356	1871	8.6107	-1.375***	(-37.8)
GROWTH_OPPORT	22382	2.1241	1871	1.1992	0.925***	(24.09)
CASH_SHORTFALL	22382	-0.1864	1871	-0.1209	-0.0655***	(-22.6)
OPERATING_LOSS	22382	0.07457	1871	0.01550	0.0591***	(9.64)
TAX_RATE	22382	0.2996	1871	0.00855	0.291***	(27.44)
DIV_CONST	22382	0.7230	1871	0.2143	0.509***	(47.52)
INVEST_EXPENSE	22382	0.05433	1871	0.05962	-0.0053***	(-3.97)
LEVERAGE	22382	0.5193	1871	0.698	-0.178***	(-35.9)
FP_FACTOR	22382	-0.0174	1871	0.0176	-0.035***	(-37.7)
DIV_YIELD	22382	2.6597	1871	5.7928	-3.133***	(-8.92)
AGE	22382	53.812	1871	53.883	-0.071	(-0.37)
DUALITY	22382	0.9051	1871	0.9359	-0.0308***	(-4.42)
EXECDIR	22382	0.8225	1871	0.7210	0.102***	(10.88)
GENDER	22382	0.02162	1871	0.01176	0.00987**	(2.87)
TURNOVER	22382	0.1128	1871	0.1149	-0.00210	(-0.28)
RATING_DUM	22382	0.4930	1871	0.8471	-0.354***	(-30.0)
PRESIDENT	22382	0.4551	1871	0.4655	-0.0104	(-0.87)

Panel A in Table 4.17 reports the results from OLS regression results for CEOs' compensation in regulated firms. We use two additional measures of risk: systematic risk and bankruptcy risk measured by *SYS_RISK* and *ZSCORE_DUM* to control the effect of other risk factors on CEOs' pay. *SYS_RISK* is positively related to CEOs' equity and total compensation, negatively related to bonuses and not related to salary compensation in regulated firms. *ZSCORE_DUM* is positively related to CEOs' salary, equity pay and total compensation but not related to CEOs' bonus pay. This evidence shows the important roles of systematic risk and bankruptcy risk on CEOs' pay. Our main variable of interest is *IDIO_RISK*. We find that *IDIO_RISK* is negatively related to CEOs' bonus, equity and total compensation, but not related to salary in regulated firms. We also control for the effect of firm's market and account performance on CEO's compensation. We find that stock return is positively related to CEO's bonus, equity and total compensation but not related to salary compensation. Contrary to our expectation, ROA is negatively related to CEO's salary, equity and total compensation.

Table 4.17 CEO Compensation and Idiosyncratic Risk: OLS Regression Results for Regulated and Non-regulated firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in regulated and non-regulated firms. The table shows OLS regression results for CEOs' salary, bonuses, equity and total compensation. The regulated firms' sample contains 1,871 observations and the non-regulated firms' sample contains 22,392 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Effects of Idiosyncratic Risk on CEOs' Compensation in Regulated Firms					
Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.22537	8.20756***	1.85880***	1.22661***
		(0.129)	(0.999)	(0.527)	(0.250)
SYS_RISK	+	10.63195	-1.79e+02***	113.38051***	36.68739**
		(6.790)	(52.431)	(25.754)	(13.110)
ZSCORE_DUM	+	0.08678***	-0.22135	0.37402***	0.17784***
		(0.020)	(0.154)	(0.080)	(0.039)
STOCK_RET	+	0.04585	0.57575*	0.32308**	0.23671***
		(0.030)	(0.235)	(0.118)	(0.059)
ROA	+	-0.94228*	25.79308***	-8.99378***	-2.74690**
		(0.451)	(3.481)	(1.886)	(0.870)
LSIZE	+	0.25561***	0.39025***	0.70240***	0.48907***
		(0.010)	(0.075)	(0.041)	(0.019)
GROWTH_OPPORT	+	-0.03082	-2.77587**	0.51033	0.31702
		(0.110)	(0.849)	(0.398)	(0.212)
CASH_SHORTFALL	+	-0.41490*	-2.32837	-1.99682**	-1.57891***
		(0.162)	(1.253)	(0.634)	(0.313)
OPERATING_LOSS	-	-0.00406	0.87623	0.07601	0.32919**
		(0.064)	(0.492)	(0.264)	(0.123)
TAX_RATE	0	-0.18701*	-0.42557	-0.06453	-0.36112*
		(0.082)	(0.634)	(0.286)	(0.159)

Table 4.17 – Continued

DIV_CONST	+	0.05906**	-0.81460***	0.20023*	-0.00937
		(0.021)	(0.159)	(0.081)	(0.040)
INVEST_EXPENSE	+	0.35882	3.37775	3.15429**	1.51067**
		(0.248)	(1.912)	(0.984)	(0.478)
LEVERAGE	-	0.16825	3.31195**	0.25223	1.09743***
		(0.135)	(1.043)	(0.547)	(0.261)
FP_FACTOR	+	-0.54754	-29.15885**	-3.99018	-3.02112
		(1.386)	(10.705)	(5.186)	(2.677)
DIV_YIELD	-	-0.00433**	-0.01043	-0.02856***	-0.01144***
		(0.002)	(0.012)	(0.006)	(0.003)
AGE	+	0.01785***	-0.00128	0.01390**	0.01523***
		(0.001)	(0.010)	(0.005)	(0.002)
DUALITY	+	0.00443	1.03558***	0.11428	0.08438
		(0.030)	(0.232)	(0.117)	(0.058)
EXECDIR	+	0.53416***	0.36566*	0.84860***	0.73993***
		(0.019)	(0.144)	(0.075)	(0.036)
GENDER	-	0.17235*	1.34047*	-0.25469	0.18552
		(0.069)	(0.533)	(0.249)	(0.133)
TURNOVER	?	-0.33257***	0.02956	-0.46900***	-0.39038***
		(0.024)	(0.185)	(0.107)	(0.046)
RATING_DUM	+	-0.04176*	-0.32297*	0.02652	-0.06700
		(0.021)	(0.163)	(0.083)	(0.041)
PRESIDENT	+	0.17582***	-0.34676**	0.49552***	0.24909***
		(0.017)	(0.132)	(0.068)	(0.033)
CONSTANT		2.46252***	-2.09666	-2.76179***	-0.06555
		(0.201)	(1.553)	(0.801)	(0.388)
Observations		1871	1871	1311	1871
Adjusted R^2		0.68	0.12	0.46	0.61

Panel B: Effects of Idiosyncratic Risk on CEOs' Compensation in Non-regulated Firms

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.02558	1.17430***	1.41871***	0.82228***
		(0.033)	(0.124)	(0.062)	(0.042)
SYS_RISK	+	-0.11208	-27.82691***	24.79695***	9.08882***
		(1.118)	(4.245)	(2.149)	(1.451)
ZSCORE_DUM	+	0.08180***	0.05916	-0.02807	0.07971***
		(0.012)	(0.045)	(0.024)	(0.015)
STOCK_RET	+	0.01650	0.71229***	-0.20226***	-0.00956
		(0.011)	(0.042)	(0.022)	(0.014)
ROA	+	0.77318***	5.58545***	0.11200	0.95495***
		(0.083)	(0.315)	(0.165)	(0.108)
LSIZE	+	0.17499***	0.43177***	0.58273***	0.44426***
		(0.005)	(0.018)	(0.009)	(0.006)
GROWTH_OPPORT	+	-0.01689***	-0.05680***	0.08088***	0.02932***
		(0.004)	(0.015)	(0.008)	(0.005)
CASH_SHORTFALL	+	0.19937***	1.27159***	-0.24261**	0.24526***
		(0.043)	(0.164)	(0.085)	(0.056)
OPERATING_LOSS	-	-0.08361***	0.05566	0.10932**	-0.06497**
		(0.019)	(0.072)	(0.038)	(0.024)

Table 4.17 – Continued

TAX_RATE	0	0.04719***	-0.45375***	0.17567***	0.08102***
		(0.010)	(0.039)	(0.020)	(0.013)
DIV_CONST	+	-0.02361*	-0.04019	0.04020	-0.01918
		(0.011)	(0.042)	(0.021)	(0.014)
INVEST_EXPENSE	+	-0.32194***	1.88989***	0.69284***	0.29517*
		(0.094)	(0.358)	(0.184)	(0.123)
LEVERAGE	-	0.15132***	0.23089*	-0.42408***	-0.02595
		(0.026)	(0.098)	(0.053)	(0.033)
FP_FACTOR	+	0.15968	-4.49200***	-8.58180***	-3.95487***
		(0.193)	(0.734)	(0.380)	(0.251)
DIV_YIELD	-	0.00029	-0.00549***	-0.00362***	-0.00176***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	+	0.01063***	-0.00390	-0.00692***	0.00153
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.08889***	0.73760***	-0.12114***	0.13754***
		(0.016)	(0.060)	(0.032)	(0.021)
EXECDIR	+	0.43214***	0.20596***	0.92657***	0.78647***
		(0.013)	(0.050)	(0.027)	(0.017)
GENDER	-	0.06673*	-0.51866***	0.13206*	0.00618
		(0.032)	(0.121)	(0.063)	(0.041)
TURNOVER	?	-0.35768***	-0.04909	0.01422	-0.20577***
		(0.015)	(0.058)	(0.032)	(0.020)
RATING_DUM	+	0.05080***	0.18456***	0.03212	0.06416***
		(0.013)	(0.049)	(0.025)	(0.017)
PRESIDENT	+	0.18891***	-0.40808***	0.26502***	0.19641***
		(0.010)	(0.038)	(0.019)	(0.013)
CONSTANT		3.65489***	-0.16156	1.40979***	2.72795***
		(0.055)	(0.207)	(0.109)	(0.071)
Observations		22382	22382	16971	22382
Adjusted R^2		0.28	0.10	0.40	0.42
Wald test of the coefficient of idiosyncratic risk in two regressions: Chi-squared and (p-value)		3.5* (.062)	45.58*** (.000)	.71 (.399)	1.66 .198)

Panel B in Table 4.17 presents the regression results for non-regulated firms. The positive and statistically significant coefficient for *IDIO_RISK* for bonuses, equity and total compensation indicates a positive impact of *IDIO_RISK* on CEOs' bonuses, equity pay and total compensation in non-regulated firms. In this study, we are interested in finding whether or not *IDIO_RISK* has a differential impact on CEOs' compensation in regulated and non-regulated firms.

We use the Wald test to examine whether the coefficients on *IDIO_RISK* are statistically different across the two groups. The chi-squared test statistics (p-values) for salary, bonuses, equity and total compensation regressions are 3.5(0.062), 45.58 (0.000), .71 (0.39) and 1.66 (0.198), respectively. The Wald test results suggest that the impact of *IDIO_RISK* on CEOs' salary and bonus compensation is different between regulated and non-regulated firms. However, the test results show that there is no statistically significant difference in the impact of *IDIO_RISK* on CEOs' equity and total compensation in the two groups.

Table 4.18 Differential Impact of Idiosyncratic Risk on CEO Compensation: OLS Regressions for Regulated and Non-regulated firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in regulated and non-regulated firms. The table shows OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample contains 24,253 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0314	1.1814***	1.4111***	0.8188***
		(0.029)	(0.161)	(0.166)	(0.075)
REG_DUM	+	-0.3086***	-1.6782***	-1.3504***	-0.9316***
		(0.026)	(0.158)	(0.104)	(0.054)
*REG_DUM*IVOL*	+/-	0.2158	4.6813***	3.1271***	1.8077***
		(0.119)	(0.728)	(0.464)	(0.271)
SYS_RISK	+	-0.1083	-28.5893***	25.3706***	9.2531***
		(1.533)	(4.930)	(2.640)	(2.242)
ZSCORE_DUM	+	0.0754***	0.0623	-0.0032	0.0846***
		(0.013)	(0.043)	(0.025)	(0.017)
STOCK_RET	+	0.0182	0.7125***	-0.1902***	-0.0021
		(0.013)	(0.042)	(0.022)	(0.016)
ROA	+	0.7746***	5.7022***	0.0289	0.9183***
		(0.079)	(0.331)	(0.187)	(0.122)
LSIZE	+	0.1816***	0.4337***	0.5830***	0.4475***
		(0.008)	(0.019)	(0.010)	(0.008)
GROWTH_OPPORT	-	-0.0169***	-0.0603***	0.0826***	0.0295***
		(0.005)	(0.014)	(0.015)	(0.008)
CASH_SHORTFALL	+	0.1972***	1.2140***	-0.2617**	0.2209***
		(0.052)	(0.162)	(0.086)	(0.058)
OPERATING_LOSS	+	-0.0806**	0.0863	0.1154**	-0.0534
		(0.027)	(0.067)	(0.040)	(0.030)
TAX_RATE	-	0.0452***	-0.4478***	0.1670***	0.0760***
		(0.010)	(0.041)	(0.019)	(0.013)
DIV_CONST	0	-0.0163	-0.0805	0.0489*	-0.0156
		(0.010)	(0.041)	(0.021)	(0.014)
INVEST_EXPENSE	+	-0.2998***	1.9045***	0.7889***	0.3625**
		(0.089)	(0.350)	(0.184)	(0.114)
LEVERAGE	+	0.1555***	0.2632*	-0.4084***	-0.0080
		(0.027)	(0.107)	(0.055)	(0.037)
FP_FACTOR	-	0.1501	-4.4338***	-8.7055***	-4.0497***
		(0.212)	(0.738)	(0.477)	(0.280)

Table 4.18 – Continued

DIV_YIELD	+	0.0002	-0.0056*	-0.0041***	-0.0019***
		(0.000)	(0.002)	(0.001)	(0.000)
AGE	-	0.0110***	-0.0041	-0.0060***	0.0022**
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.0840***	0.7530***	-0.1094***	0.1320***
		(0.024)	(0.064)	(0.030)	(0.028)
EXECDIR	+	0.4424***	0.2140***	0.9250***	0.7834***
		(0.012)	(0.043)	(0.026)	(0.017)
GENDER	+	0.0725**	-0.4485***	0.1207	0.0195
		(0.024)	(0.129)	(0.062)	(0.040)
TURNOVER	-	-0.3556***	-0.0384	-0.0214	-0.2243***
		(0.016)	(0.051)	(0.036)	(0.022)
RATING_DUM	?	0.0387*	0.1486**	0.0359	0.0545**
		(0.015)	(0.046)	(0.024)	(0.018)
PRESIDENT	+	0.1891***	-0.4090***	0.2895***	0.2053***
		(0.009)	(0.038)	(0.021)	(0.013)
CONSTANT	+	3.5802***	-0.1821	1.3000***	2.6566***
		(0.057)	(0.214)	(0.141)	(0.077)
Observations		24253	24253	18282	24253
Adjusted R^2		0.29	0.10	0.41	0.43

In addition to the Wald test in Table 4.17, we conduct another test using the interaction of *REG_DUM* and *IDIO_RISK.* We expect to find a non-zero coefficient for the interaction term. Positive and statistically significant coefficients of the interaction variable in CEOs' bonus, equity and total compensation regressions show that *IDIO_RISK* has a differential impact on bonus, equity and total compensation components of CEOs' pay in regulated firms. Thus, our test results support our hypothesis that *IDIO_RISK* has a differential impact on CEOs' bonus, equity and total pay. However, we do not find a differential impact of *IDIO_RISK* on CEOs' salary in regulated and non-regulated firms.

To conclude, the impact of *IDIO_RISK* on CEOs' pay is higher on regulated firms than on non-regulated firms. The evidence presented in this analysis supports our hypothesis that *IDIO_RISK* has a differential impact on CEOs' pay in regulated versus non-regulated firms. Specifically, the Wald test results show that *IDIO_RISK* has a differential impact on CEOs' salary and bonus pay but not on equity and total pay. However, our regression models with interaction terms of *REG_DUM* and *IDIO_RISK* show that *IDIO_RISK* has a differential impact on CEOs' bonus, equity and total pay between regulated and non-regulated firms, which supports our H3.

4.5 Idiosyncratic Risk and CEO Compensation in Old and New Economy Firms

We also study the impact of idiosyncratic risk on CEOs' compensation in two subsets of our sample: old economy firms and new economy firms. Following Anderson, Banker, and Ravindran (2000), Over and Shaefer (2001), Ittner, Lambert, and Larcker (2003), and Murphy (2003), we define new economy firms as firms in the computer, software, internet, telecommunications, or networking fields, and old economy firms as companies with primary SIC Codes less than 4000 not otherwise categorized as new economy firms[34].

We examine whether the impact of idiosyncratic risk on CEOs' compensation is different between old and new economy firms for two reasons. First, employees in old economy firms are more entrenched than in new economy firms; and, therefore, we expect that the impact of idiosyncratic risk on CEOs' compensation in old economy firms to be greater than in new economy firms. Second, new economy firms have different pay practices from old economy firms[35].

Table 4.19 Comparison of Average CEO Pay in New and Old Economy Firms: Univariate Tests

This table shows the summary statistics for our dependent and right-hand side variables in the regulated firms CEOs' compensation analysis. The sample contains 12,468 observations for old economy firms and 2,560 observations for new economy firms, and the sample covers the period1992 to 2009. All variables are defined in Appendix A. Difference is the average difference between old and new economy firms for the given variables. Test statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	N	Old Economy Firms	N	New Economy Firms	Difference	t-stat
SALARY	12468	572.04	2560	469.27	102.8***	(14.62)
BONUS	12468	524.47	2560	432.99	91.48***	(3.90)
EQUITY_COMP	12454	1813.1	2555	4492.3	-2679.2***	(-12.47)
TOTAL_COMP	12468	3225.7	2560	5527.3	-2301.6***	(-10.24)
IDIO_RISK	12468	0.3248	2560	0.4623	-0.137***	(-42.32)
SYS_RISK	12468	0.002659	2560	0.003655	-0.0011***	(-10.16)

34 New economy firms are defined as companies with primary SIC designations of 3570 (Computer and Office Equipment), 3571 (Computer Storage Devices), 3576 (Computer Communication Equipment), 3677 (Computer Peripheral Equipment), 3661 (Telephone and Telegraph Apparatus), 3674 (Semiconductor and Related Devices), 4812 (Wireless Telecommunication), 4813 (Telecommunication), 5045 (Computer and Software Wholesalers), 5961 (Electronic Mail-Order Houses), 7370 (Computer Programming, Data Processing), 3771 (Computer Programming Services), 7372 (Prepackaged Software), and 7373 (Computer Integrated Systems Design). Old economy firms are firms with primary SIC Codes less than 4000 not otherwise categorized as new economy firms.

35 For example, Anderson, Banker, and Ravindran (2000), Ittner, Lambert, and Larcker (2003), and Murphy (2003) document that there are differences in pay practices in new and old economy firms.

Table 4.19 – Continued

ZSCORE_DUM	12468	0.8425	2560	0.6531	0.189***	(22.63)
STOCK_RET	12468	0.09569	2560	0.1534	-0.0577***	(-6.18)
ROA	12468	0.1195	2560	0.1242	-0.0047**	(-2.84)
LSIZE	12468	7.2917	2560	6.7671	0.525***	(15.96)
GROWTH_OPPORT	12468	2.0009	2560	3.0883	-1.087***	(-28.60)
CASH_SHORTFALL	12468	-0.1709	2560	-0.2364	0.0655***	(25.41)
OPERATING_LOSS	12468	0.06015	2560	0.1398	-0.0797***	(-14.15)
TAX_RATE	12468	0.3217	2560	0.3777	-0.0560***	(-5.49)
DIV_CONST	12468	0.6951	2560	0.8086	-0.113***	(-11.63)
INVEST_EXPENSE	12468	0.05453	2560	0.04230	0.0122***	(10.12)
LEVERAGE	12468	0.5265	2560	0.3886	0.138***	(32.39)
FP_FACTOR	12468	-0.01597	2560	-0.04248	0.0265***	(31.69)
DIV_YIELD	12468	2.9790	2560	1.4993	1.480***	(4.46)
AGE	12468	54.706	2560	51.143	3.563***	(20.31)
DUALITY	12468	0.9232	2560	0.8477	0.0755***	(12.24)
EXECDIR	12468	0.8206	2560	0.8453	-0.0247**	(-3.00)
GENDER	12468	0.01724	2560	0.01953	-0.00229	(-0.80)
TURNOVER	12468	0.1092	2560	0.1191	-0.00998	(-1.47)
RATING_DUM	12468	0.5401	2560	0.2359	0.304***	(28.81)
PRESIDENT	12468	0.4441	2560	0.4918	-0.0477***	(-4.42)

Table 4.19 provides a summary of variables used in the analysis of the impact of idiosyncratic risk on CEOs' compensation in new and old economy firms. The sample contains 12,468 CEOs in old economy firms and 2,560 CEOs in new economy firms. The average salary (bonus) for CEOs in old economy firms is higher than that in new economy firms. The average salary (bonus) difference is 102.8 (91.48) thousand and the difference is statistically significant. However, CEOs in new economy firms receive significantly higher equity and total compensation than CEOs in old economy firms, which is consistent with Anderson, Banker, and Ravindran (2000), Ittner, Lambert, and Larcker (2003), and Murphy (2003). The average idiosyncratic risk in new economy firms is significantly higher than in old economy firms. The difference is 13.7% and is statistically different across the two groups. Similarly, an average annual stock return is 5.77% higher in new economy firms than in old economy firms; the difference is statistically significant. This evidence shows statistically significant differences in these two groups.

Table 4.20 reports results from OLS regression of CEOs' compensation for old and new economy firms. Panel A in Table 4.20 presents estimation results for CEOs' compensation in new economy firms. Positive and statistically significant coefficients of *IDIO_RISK* show that there is a positive effect of *IDIO_RISK* on CEOs' bonus, equity and total compensation in new economy firms. However, there is no relationship between CEOs' salary and *IDIO_RISK*.

We also use *SYS_RISK* and *ZSCORE_DUM* as additional measures of risk in our analysis. *SYS_RISK* is positively related to CEOs' equity pay but is not related to salary, bonuses and total compensation. *ZSCORE_DUM* is positively related to CEOs' salary, bonuses and total compensation but is not related to equity compensation. Firm characteristics and CEOs' characteristics also seem to be very important determinants of CEOs' pay. For example, firm size is positively related to CEOs' bonus, equity and total pay in new economy firms.

Panel B of Table 4.20 presents the regression results for old economy firms. In all specifications, coefficients for *IDIO_RISK* are positive and statistically significant, supporting our H1. *SYS_RISK* is positively related to CEOs' salary, equity and total pay but negatively related to bonus compensation in non-regulated firms. *ZSCORE_DUM* has a positive effect on all components of CEOs' pay in the non-regulated firms' sample.

Table 4.20 CEO Compensation and Idiosyncratic Risk: OLS Regression Results for New and Old Economy Firms

This table shows the pooled regression results for CEOs' compensation and idiosyncratic volatility in new and old economy firms. Panel A (Panel B) shows regression results for CEOs' compensation in new (old) economy firms. In both panels dependent variables are CEOs' salary, bonuses, equity pay, and total compensation. The new economy firms sample contains 2,560 observations and the old economy firms sample contains 12,468 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Effects of Idiosyncratic Risk on CEO Compensation in New Economy Firms

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.02557	3.21958***	1.43113***	1.42016***
		(0.176)	(0.374)	(0.200)	(0.195)
SYS_RISK	+	-1.17891	-28.47282**	11.19270*	8.33869
		(4.881)	(10.363)	(5.236)	(5.406)
ZSCORE_DUM	+	0.09908	0.11326	-0.03747	0.18604**
		(0.057)	(0.121)	(0.065)	(0.063)
STOCK_RET	+	-0.03179	0.49064***	-0.38809***	-0.20287***
		(0.050)	(0.107)	(0.056)	(0.056)

Table 4.20 – Continued

ROA	+	0.13608	7.37078***	-1.13322*	-0.43521
		(0.378)	(0.802)	(0.457)	(0.418)
LSIZE	+	-0.00237	0.41987***	0.65042***	0.36722***
		(0.023)	(0.049)	(0.027)	(0.026)
GROWTH_OPPORT	+	-0.00068	-0.03077	0.05327***	0.03257**
		(0.010)	(0.022)	(0.011)	(0.011)
CASH_SHORTFALL	+	0.63612**	0.84629	-0.16677	0.25136
		(0.223)	(0.473)	(0.258)	(0.247)
OPERATING_LOSS	-	-0.38744***	-0.19418	0.01134	-0.31626***
		(0.081)	(0.171)	(0.092)	(0.089)
TAX_RATE	0	0.19978***	-0.31868**	0.02684	0.20230***
		(0.053)	(0.113)	(0.059)	(0.059)
DIV_CONST	+	-0.19649**	-0.16327	0.12197	-0.13596
		(0.067)	(0.142)	(0.076)	(0.074)
INVEST_EXPENSE	+	0.06204	1.88892	-1.36363	-0.91230
		(0.640)	(1.359)	(0.716)	(0.709)
LEVERAGE	-	0.65247***	0.23897	-0.12147	0.33124*
		(0.150)	(0.319)	(0.175)	(0.166)
FP_FACTOR	+	0.47141	-2.68974	-10.57616***	-5.16605***
		(0.969)	(2.058)	(1.091)	(1.073)
DIV_YIELD	-	0.00122	-0.00081	-0.00911*	-0.00166
		(0.001)	(0.002)	(0.004)	(0.001)
AGE	+	0.00639*	-0.00315	-0.00832*	0.00085
		(0.003)	(0.007)	(0.004)	(0.004)
DUALITY	+	0.44046***	0.59475***	-0.11973	0.53551***
		(0.069)	(0.147)	(0.082)	(0.077)
EXECDIR	+	0.29289***	0.04281	0.84967***	0.71612***
		(0.073)	(0.154)	(0.087)	(0.080)
GENDER	-	0.30957	0.62925	0.21610	0.53426**
		(0.179)	(0.380)	(0.201)	(0.198)
TURNOVER	?	-0.27218***	-0.01133	0.31923***	-0.03285
		(0.080)	(0.169)	(0.095)	(0.088)
RATING_DUM	+	0.10873	0.08481	-0.10549	0.16291
		(0.077)	(0.164)	(0.087)	(0.086)
PRESIDENT	+	0.05110	-0.28541*	-0.14454*	-0.01837
		(0.055)	(0.116)	(0.062)	(0.061)
CONSTANT		4.90040***	-1.19071*	1.77499***	2.91624***
		(0.284)	(0.602)	(0.326)	(0.314)
Observations		2560	2560	1875	2560
Adjusted R^2		0.08	0.11	0.43	0.23

Panel B: Effects of Idiosyncratic Risk on CEO Compensation in Old Economy Firms

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.04176	1.17898***	1.80471***	0.78403***
		(0.045)	(0.204)	(0.102)	(0.060)
SYS_RISK	+	0.76888	-41.53281***	22.64057***	6.51779***
		(1.265)	(5.753)	(2.829)	(1.678)
ZSCORE_DUM	+	0.0649***	0.03073	0.04133	0.04730*
		(0.014)	(0.065)	(0.033)	(0.019)

Table 4.20 – Continued

STOCK_RET	+	0.01946	0.68326***	-0.19259***	0.01660
		(0.013)	(0.059)	(0.029)	(0.017)
ROA	+	0.66120***	6.55055***	0.34690	1.27778***
		(0.093)	(0.424)	(0.211)	(0.124)
LSIZE	+	0.20726***	0.47456***	0.60426***	0.47183***
		(0.006)	(0.025)	(0.012)	(0.007)
GROWTH_OPPORT	+	-0.00039	-0.06605*	0.07458***	0.03802***
		(0.006)	(0.029)	(0.013)	(0.008)
CASH_SHORTFALL	+	0.19789***	0.79577***	0.06092	0.32926***
		(0.050)	(0.227)	(0.110)	(0.066)
OPERATING_LOSS	-	0.01468	0.14773	0.10953*	0.01349
		(0.023)	(0.104)	(0.052)	(0.030)
TAX_RATE	0	0.03943***	-0.43239***	0.12971***	0.04255**
		(0.011)	(0.051)	(0.024)	(0.015)
DIV_CONST	+	-0.01802	-0.01711	-0.02209	-0.03780*
		(0.012)	(0.053)	(0.026)	(0.015)
INVEST_EXPENSE	+	-0.48310***	2.31612***	0.33170	0.12672
		(0.101)	(0.460)	(0.223)	(0.134)
LEVERAGE	-	0.08626**	0.40718**	-0.26297***	0.06866
		(0.031)	(0.143)	(0.072)	(0.042)
FP_FACTOR	+	0.22798	-2.60998*	-8.35548***	-3.29949***
		(0.237)	(1.079)	(0.529)	(0.315)
DIV_YIELD	-	-0.00035	-0.00612**	-0.00625***	-0.00324***
		(0.001)	(0.002)	(0.001)	(0.001)
AGE	+	0.01069***	-0.00263	-0.00274	0.00283**
		(0.001)	(0.003)	(0.002)	(0.001)
DUALITY	+	0.04011*	0.68688***	-0.06785	0.10687***
		(0.019)	(0.087)	(0.043)	(0.025)
EXECDIR	+	0.46600***	0.26157***	0.92425***	0.81920***
		(0.014)	(0.065)	(0.033)	(0.019)
GENDER	-	-0.06372	-0.85852***	0.06072	-0.17194***
		(0.039)	(0.177)	(0.091)	(0.052)
TURNOVER	?	-0.38138***	-0.14047	-0.00859	-0.22017***
		(0.017)	(0.077)	(0.040)	(0.022)
RATING_DUM	+	0.01195	0.05852	0.05536	0.03166
		(0.014)	(0.065)	(0.031)	(0.019)
PRESIDENT	+	0.19494***	-0.46259***	0.30956***	0.22231***
		(0.011)	(0.049)	(0.024)	(0.014)
CONSTANT		3.49915***	-0.55163	0.72346***	2.45184***
		(0.063)	(0.286)	(0.145)	(0.083)
Observations		12468	12468	9713	12468
Adjusted R^2		0.39	0.11	0.44	0.53
Wald test of the coefficient of idiosyncratic risk in two regressions: Chi-squared and (p-value)		.32 (.57)	23.11*** (000)	2.19 (.138)	12.92*** (000)

We use the Wald test to examine whether the coefficients of *IDIO_RISK* are statistically different across the two groups. The chi-squared test statistics (p-values) for salary, bonuses, equity and total compensation regressions are 0.32 (0.57), 23.11 (0.000), 2.19(0.14) and 12.92 (0.000), respectively. The Wald test results suggest that the impact of *IDIO_RISK* on CEOs' bonus and total compensation is significantly different between new and old economy firms. However, the test results show that there is no statistically significant difference in the impact of *IDIO_RISK* on CEOs' salary and equity compensation in the two groups. Therefore, we conduct further examination using the interaction term of *IDIO_RISK* and *NEW_FIRM* in OLS regression models.

Table 4.21 Differential Impact of Idiosyncratic Risk on CEO Compensation: OLS Regressions for New and Old Economy Firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in new and old-economy firms. The table shows OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample contains 15,028 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.0533	1.6723***	1.6504***	0.9034***
		(0.045)	(0.186)	(0.106)	(0.072)
NEW_DUM	+	-0.0900***	-0.2004**	0.3376***	0.0745**
		(0.020)	(0.069)	(0.037)	(0.027)
*NEW_DUM*IVOL*	+/-	0.1620**	-0.1266	0.2659***	0.2299***
		(0.054)	(0.154)	(0.076)	(0.065)
SYS_RISK	+	0.1883	-38.4500***	20.6291***	7.3780**
		(2.090)	(5.974)	(2.554)	(2.822)
ZSCORE_DUM	+	0.0869***	0.0394	0.0179	0.0914***
		(0.020)	(0.056)	(0.030)	(0.023)
STOCK_RET	+	0.0195	0.6208***	-0.2255***	-0.0269
		(0.017)	(0.052)	(0.027)	(0.021)
ROA	+	0.6297***	6.4940***	0.1703	0.9625***
		(0.096)	(0.400)	(0.210)	(0.151)
LSIZE	+	0.1595***	0.4597***	0.6095***	0.4482***
		(0.012)	(0.023)	(0.011)	(0.011)
GROWTH_OPPORT	-	-0.0096	-0.0398*	0.0639***	0.0311***
		(0.005)	(0.016)	(0.013)	(0.008)
CASH_SHORTFALL	+	0.3154***	0.8734***	-0.0455	0.3457***
		(0.068)	(0.202)	(0.103)	(0.076)
OPERATING_LOSS	+	-0.0984*	0.0590	0.0672	-0.0805*
		(0.039)	(0.085)	(0.048)	(0.041)
TAX_RATE	-	0.0673***	-0.4080***	0.1105***	0.0664***
		(0.013)	(0.048)	(0.022)	(0.016)

Table 4.21 – Continued

DIV_CONST	0	-0.0402**	-0.0338	0.0048	-0.0467**
		(0.013)	(0.051)	(0.024)	(0.016)
INVEST_EXPENSE	+	-0.3867**	2.2474***	0.1022	0.0315
		(0.127)	(0.430)	(0.228)	(0.137)
LEVERAGE	+	0.2023***	0.3869**	-0.2250**	0.1231*
		(0.037)	(0.142)	(0.069)	(0.049)
FP_FACTOR	-	0.2256	-2.5885**	-8.8246***	-3.7097***
		(0.249)	(0.920)	(0.499)	(0.340)
DIV_YIELD	+	0.0007	-0.0030	-0.0067***	-0.0024***
		(0.001)	(0.002)	(0.001)	(0.000)
AGE	-	0.0108***	-0.0025	-0.0043**	0.0031**
		(0.001)	(0.003)	(0.002)	(0.001)
DUALITY	+	0.1483***	0.6720***	-0.0816*	0.2285***
		(0.035)	(0.080)	(0.037)	(0.041)
EXECDIR	+	0.4313***	0.2279***	0.9173***	0.7946***
		(0.016)	(0.055)	(0.032)	(0.021)
GENDER	+	0.0033	-0.6259***	0.0892	-0.0492
		(0.036)	(0.179)	(0.085)	(0.054)
TURNOVER	-	-0.3602***	-0.1097	0.0435	-0.1856***
		(0.021)	(0.066)	(0.045)	(0.029)
RATING_DUM	?	0.0464	0.0785	0.0297	0.0629*
		(0.025)	(0.060)	(0.030)	(0.025)
PRESIDENT	+	0.1718***	-0.4495***	0.2364***	0.1787***
		(0.012)	(0.048)	(0.024)	(0.016)
CONSTANT	+	3.7252***	-0.6158*	0.8995***	2.4590***
		(0.083)	(0.256)	(0.137)	(0.093)
Observations		15028	15028	11588	15028
Adjusted R^2		0.26	0.11	0.45	0.43

We present estimation results of OLS regression with interaction term of NEW_DUM and IDIO_RISK in Table 4.21. A positive and statistically significant coefficient of NEW_DUM*IVOL in CEOs' total compensation regression confirms the Wald test result for CEOs' total pay differential in Table 4.20. However, our test results in Table 4.21 do not find a statistically differential impact of *IDIO_RISK* on CEOs' bonus pay. In addition, the reported results in Table 4.21 suggest that *IDIO_RISK* has a differential impact on CEOs' equity pay and total compensation between new and old economy firms. Thus, overall our test results in Table 4.21 support our hypothesis that *IDIO_RISK* has a differential impact on CEO's compensation.

4.6 Idiosyncratic Risk and CEO Compensation in High-Tech vs. Non-Tech Firms

We further study the effect of *IDIO_RISK* and CEOs' compensation in two subsets of our sample: high-technology ("high-tech" hereafter) firms and non-technology ("non-tech" hereafter) firms. More than half of economic growth during the period 1945 to 2002 is attributed to innovations within the high-tech sector (Leary, 2002). Following Kasznik and Lev (1995), Johnson et al. (2001), Baginski and Kimbrouch (2000), we define high-tech firms as firms in pharmaceuticals, R&D services, programming, computers or electronics industries, and non-tech firms as firms not in high-tech categories[36].

High-tech firms have different characteristics than those of non-tech firms. Research also suggests that inventions create considerable economic value for the inventing firm (Deng, Lev and Narin, 2001; Rosenkopf and Nerkar, 2001; Lanjouw and Schankerman, 2004; Hall, Jaffe and Trajtenberg, 2005). Therefore, high-tech firms should reward executives for behavioral evidence of valued knowledge creation as reflected in innovation quality (Makri et al., 2006). High-tech firms are also exposed to higher risk. Therefore, there should be a differential impact of *IDIO_RISK* on CEOs' pay between high-tech and non-tech firms.

Table 4.22 Comparison of Average CEO Pay in High-Tech and Non-Tech Firms: Univariate Tests

This table shows the summary statistics for our dependent and right-hand side variables in high-tech and non-tech firms CEOs' compensation analysis. The sample contains 24,253 observations: 21,995 non-tech and 2,258 high-tech firms, and the sample covers the period 1992 to 2009. All variables are defined in Appendix A. Difference is the average difference between non-tech and high-tech firms for the given variables. Test statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	N	Non Tech Firms	N	Tech Firms	Difference	t-stat
SALARY	21995	562.92	2258	563.76	-0.842	(-0.11)
BONUS	21995	489.49	2258	454.78	34.71	(1.55)
EQUITY_COMP	21968	1818.3	2254	4829.0	-3010.7***	(-16.03)
TOTAL_COMP	21995	3144.9	2258	6081.0	-2936.2***	(-14.78)
IDIO_RISK	21995	0.3287	2258	0.4338	-0.105***	(-27.93)
SYS_RISK	21995	0.002567	2258	0.002863	-0.0003**	(-3.14)
ZSCORE_DUM	21995	0.7732	2258	0.7205	0.0527***	(5.65)
STOCK_RET	21995	0.09363	2258	0.1335	-0.0399***	(-4.28)

36 New economy firms are defined as companies with primary SIC designations of 2833-2836 (Pharmaceuticals), 8731-8734 (R&D Services), 7371-7379 (Programming), 3570-3577 (Computers) or 3600-3674 (Electronics), and 0 otherwise.

Table 4.22 – Continued

ROA	21995	0.1139	2258	0.1347	-0.0209***	(-12.80)
LSIZE	21995	7.3704	2258	7.0616	0.309***	(8.99)
GROWTH_OPPORT	21995	1.9257	2258	3.2899	-1.364***	(-39.45)
CASH_SHORTFALL	21995	-0.1769	2258	-0.2242	0.0473***	(17.67)
OPERATING_LOSS	21995	0.06283	2258	0.1399	-0.0771***	(-13.73)
TAX_RATE	21995	0.2653	2258	0.3928	-0.128***	(-12.94)
DIV_CONST	21995	0.6773	2258	0.7467	-0.0694***	(-6.76)
INVEST_EXPENSE	21995	0.05697	2258	0.03293	0.0240***	(19.81)
LEVERAGE	21995	0.5461	2258	0.4062	0.140***	(30.44)
FP_FACTOR	21995	-0.01085	2258	-0.05220	0.0414***	(49.43)
DIV_YIELD	21995	2.7718	2258	4.1631	-1.391***	(-4.31)
AGE	21995	54.006	2258	51.983	2.023***	(11.47)
DUALITY	21995	0.9133	2258	0.8508	0.0625***	(9.78)
EXECDIR	21995	0.8100	2258	0.8605	-0.0505***	(-5.88)
GENDER	21995	0.01960	2258	0.03322	-0.0136***	(-4.31)
TURNOVER	21995	0.1120	2258	0.1222	-0.0102	(-1.46)
RATING_DUM	21995	0.5400	2258	0.3291	0.211***	(19.25)
PRESIDENT	21995	0.4508	2258	0.5058	-0.0550***	(-5.00)

Table 4.22 provides a summary of variables used in the analysis of the impact of idiosyncratic risk on CEOs' compensation in high-tech and non-tech firms. The sample contains 22,351 observations in non-tech and 2,326 observations in high-tech firms. Although average CEOs' salary and bonus compensation are slightly higher in non-tech firms, the differences are not statistically significant. However, average CEOs' equity and total compensation differences in high-tech and non-tech firms are 3185.9 and 2915.6 thousand, respectively. These differences are statistically significant.

There are also differences between risk and return characteristics of high-tech and non-tech firms. For example, high-tech firms have significantly higher *IDIO_RISK* and *ZSCORE_DUM.* However, there is no statistically significant difference in *SYS_RISK* between high-tech and non-tech firms. Moreover, high-tech firms have significantly higher stock returns and returns on assets relative to non-tech firms.

Table 4.23 reports results from OLS regression of CEOs' compensation for non-tech and high-tech firms. Panel A in Table 4.23 presents estimation results for CEOs' compensation in high-tech firms. Positive and statistically significant coefficients of *IDIO_RISK* show that there is a positive effect of *IDIO_RISK* on CEOs' bonus, equity and total compensation in high-tech firms. However, there is no relationship between CEOs' salary and *IDIO_RISK* in high-tech firms.

We also use *SYS_RISK* and *ZSCORE_DUM* as additional measures of risk in our analysis. *SYS_RISK* is positively related to CEOs' equity pay but not related to salary, bonuses and total compensation. *ZSCORE_DUM* is positively related to CEOs; salary, bonuses and total compensation but not related to equity compensation. Firm characteristics and CEOs' characteristics also seem to be very important determinants of CEOs' pay. For example, firm size is positively related to CEOs' bonus, equity and total pay in new economy firms.

Panel B of Table 4.23 presents the regression results for non-tech firms. In all specifications, coefficients for *IDIO_RISK* are positive and statistically significant, supporting our H1. *SYS_RISK* is positively related to CEOs' salary, equity and total pay but negatively related to bonus compensation in non-tech firms. *ZSCORE_DUM* has a positive effect on all components of CEOs' pay in the non-tech firms' sample.

Table 4.23 CEO Compensation and Idiosyncratic Risk: OLS Regression Results for High-Tech and Non-Tech Firms

This table shows the pooled regression results for CEOs' compensation and idiosyncratic volatility in high-tech and non-tech firms. Panel A (Panel B) shows regression results for CEOs' compensation in high-tech (non-tech) firms. In both panels dependent variables are CEOs' salary, bonuses, equity pay, and total compensation. The high-tech firms sample contains 2,258 observations and the non-tech firms sample contains 21,995 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Effects of Idiosyncratic Risk on CEO Compensation in High-Tech Firms

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.01289	2.98319***	1.62153***	1.42394***
		(0.175)	(0.382)	(0.178)	(0.190)
SYS_RISK	+	-8.93015	-14.53949	17.76208***	9.56859
		(5.611)	(12.250)	(5.270)	(6.094)
ZSCORE_DUM	+	0.18735**	0.31260*	-0.04739	0.27127***
		(0.062)	(0.136)	(0.063)	(0.067)
STOCK_RET	+	-0.02508	0.61631***	-0.26893***	-0.16309**
		(0.054)	(0.118)	(0.053)	(0.059)
ROA	+	0.14951	4.64481***	-1.40746***	-1.24361**
		(0.395)	(0.863)	(0.405)	(0.429)
LSIZE	+	0.04609	0.43818***	0.67439***	0.40353***
		(0.024)	(0.053)	(0.025)	(0.027)
GROWTH_OPPORT	+	-0.00127	-0.04936	0.08126***	0.04950**
		(0.015)	(0.032)	(0.014)	(0.016)

Table 4.23 – Continued

CASH_SHORTFALL	+	0.58304**	0.72033	-0.84053***	-0.23085
		(0.223)	(0.486)	(0.221)	(0.242)
OPERATING_LOSS	-	-0.3479***	-0.27493	0.09042	-0.23706*
		(0.087)	(0.191)	(0.089)	(0.095)
TAX_RATE	0	0.12655*	-0.24984*	0.12132*	0.15193*
		(0.054)	(0.119)	(0.054)	(0.059)
DIV_CONST	+	-0.08810	-0.25180	0.14634*	0.02054
		(0.065)	(0.141)	(0.064)	(0.070)
INVEST_EXPENSE	+	0.50412	4.24315**	0.90283	0.90733
		(0.652)	(1.424)	(0.617)	(0.708)
LEVERAGE	-	0.65888***	0.67250	-0.06222	0.62718***
		(0.173)	(0.378)	(0.169)	(0.188)
FP_FACTOR	+	-1.41158	-12.929***	-8.44219***	-6.7631***
		(1.173)	(2.561)	(1.163)	(1.274)
DIV_YIELD	-	0.00162	0.00222	-0.00744***	-0.00100
		(0.001)	(0.002)	(0.002)	(0.001)
AGE	+	0.01383***	-0.02332**	-0.01540***	0.00230
		(0.003)	(0.008)	(0.004)	(0.004)
DUALITY	+	0.37634***	1.02422***	-0.08247	0.47172***
		(0.073)	(0.160)	(0.075)	(0.080)
EXECDIR	+	0.29757***	0.41167*	0.88275***	0.79735***
		(0.078)	(0.170)	(0.085)	(0.085)
GENDER	-	0.21423	0.31342	-0.00876	0.12349
		(0.147)	(0.320)	(0.156)	(0.159)
TURNOVER	?	-0.25743**	-0.23094	0.23181**	-0.02530
		(0.081)	(0.177)	(0.083)	(0.088)
RATING_DUM	+	0.10245	-0.27063	-0.24777**	0.06491
		(0.077)	(0.169)	(0.077)	(0.084)
PRESIDENT	+	0.07971	-0.34984**	0.00147	0.08719
		(0.055)	(0.121)	(0.056)	(0.060)
CONSTANT		4.10646***	-1.29514	1.44128***	2.03884***
		(0.314)	(0.686)	(0.316)	(0.341)
Observations		2258	2258	1747	2258
Adjusted R^2		0.11	0.14	0.48	0.28

Panel B: Effects of Idiosyncratic Risk on CEO Compensation in Non-Tech Firms

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.08663**	1.29278***	1.48141***	0.86550***
		(0.029)	(0.130)	(0.066)	(0.041)
SYS_RISK	+	2.05521*	-27.91630***	30.19878***	12.02690***
		(1.008)	(4.492)	(2.331)	(1.429)
ZSCORE_DUM	+	0.10887***	0.18183***	0.13546***	0.16216***
		(0.010)	(0.044)	(0.024)	(0.014)
STOCK_RET	+	0.01054	0.70363***	-0.18876***	0.00976
		(0.010)	(0.045)	(0.023)	(0.014)
ROA	+	0.93118***	6.13002***	0.68819***	1.50750***
		(0.076)	(0.340)	(0.182)	(0.108)
LSIZE	+	0.19574***	0.45470***	0.55951***	0.44646***
		(0.004)	(0.018)	(0.009)	(0.006)
GROWTH_OPPORT	+	-0.02182***	-0.08048***	0.07307***	0.01957***
		(0.004)	(0.018)	(0.009)	(0.006)

Table 4.23 – Continued

CASH_SHORTFALL	+	0.13319***	1.16202***	-0.20021*	0.22403***
		(0.039)	(0.173)	(0.091)	(0.055)
OPERATING_LOSS	-	-0.04020*	0.16108*	0.13369**	-0.02454
		(0.017)	(0.077)	(0.042)	(0.024)
TAX_RATE	0	0.05763***	-0.39909***	0.22137***	0.11476***
		(0.009)	(0.041)	(0.021)	(0.013)
DIV_CONST	+	0.03034***	0.05782	0.14136***	0.07427***
		(0.009)	(0.041)	(0.021)	(0.013)
INVEST_EXPENSE	+	-0.36915***	1.82905***	0.93990***	0.40048***
		(0.082)	(0.364)	(0.191)	(0.116)
LEVERAGE	-	0.08464***	0.11263	-0.46507***	-0.10336**
		(0.023)	(0.100)	(0.055)	(0.032)
FP_FACTOR	+	-0.07917	-5.43766***	-8.73062***	-4.16499***
		(0.176)	(0.785)	(0.414)	(0.250)
DIV_YIELD	-	-0.00010	-0.01122***	-0.00279***	-0.00155**
		(0.000)	(0.002)	(0.001)	(0.001)
AGE	+	0.01084***	-0.00098	-0.00355**	0.00322***
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.02959*	0.70369***	-0.09955**	0.07639***
		(0.014)	(0.063)	(0.034)	(0.020)
EXECDIR	+	0.46624***	0.22193***	0.92932***	0.79291***
		(0.011)	(0.049)	(0.027)	(0.016)
GENDER	-	0.07277*	-0.45675***	0.15021*	0.04323
		(0.029)	(0.128)	(0.067)	(0.041)
TURNOVER	?	-0.36544***	-0.00333	-0.04071	-0.24339***
		(0.013)	(0.058)	(0.033)	(0.019)
RATING_DUM	+	0.02490*	0.15018**	0.07508**	0.04784**
		(0.011)	(0.048)	(0.025)	(0.015)
PRESIDENT	+	0.19674***	-0.41071***	0.31940***	0.21700***
		(0.008)	(0.038)	(0.020)	(0.012)
CONSTANT		3.43551***	-0.68779**	0.96974***	2.44228***
		(0.047)	(0.209)	(0.113)	(0.067)
Observations		21995	21995	16535	21995
Adjusted R^2		0.35	0.10	0.38	0.45
Wald test of the coefficient of idiosyncratic risk in two regressions: Chi-squared and (p-value)		.77 (.38)	15.36*** (.000)	.24 (.625)	8.31*** (.004)

We use the Wald test to examine whether the coefficient on *IDIO_RISK* is statistically different across the two groups. The chi-squared test statistics (p-values) for salary, bonuses, equity and total compensation regressions are 0.77 (0.38), 15.36 (0.000), .24 (0.63) and 8.31 (0.004), respectively. The test results suggest that the impact of *IDIO_RISK* on CEOs' bonuses and total compensation is significantly different between high-tech and non-tech firms. However, the test results show that there is no statistically significant differential impact of *IDIO_RISK* on CEOs' salary and equity compensation the in two groups. Therefore, we conduct further examination using an interaction term of *IDIO_RISK* and *HTECH_DUM* in OLS regression model.

Table 4.24 Differential Impact of Idiosyncratic Risk on CEO Compensation: OLS Regressions for High-Tech and Non-Tech Firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in high-tech and non-tech firms. The table shows OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample contains 24,253 observations and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.0235	1.2855***	1.2178***	0.6738***
		(0.029)	(0.175)	(0.163)	(0.071)
HTECH_DUM	+	-0.1469**	-0.9914***	0.0343	-0.3328***
		(0.054)	(0.178)	(0.092)	(0.072)
*HTECH_DUM*IVOL*	+/-	0.1763*	1.8949***	0.3272	0.8097***
		(0.084)	(0.346)	(0.188)	(0.137)
SYS_RISK	+	0.5035	-31.744***	25.9679***	8.9838***
		(1.548)	(4.882)	(2.528)	(2.204)
ZSCORE_DUM	+	0.0572***	0.0882*	0.0001	0.0886***
		(0.014)	(0.044)	(0.024)	(0.017)
STOCK_RET	+	0.0261*	0.6974***	-0.1625***	0.0108
		(0.012)	(0.042)	(0.022)	(0.016)
ROA	+	0.6340***	5.5686***	0.2372	0.9713***
		(0.081)	(0.341)	(0.185)	(0.125)
LSIZE	+	0.1837***	0.4537***	0.5874***	0.4526***
		(0.008)	(0.019)	(0.010)	(0.008)
GROWTH_OPPORT	-	-0.0189***	-0.0558***	0.0796***	0.0262***
		(0.005)	(0.015)	(0.015)	(0.008)
CASH_SHORTFALL	+	0.1667**	0.9251***	-0.1994*	0.1786**
		(0.058)	(0.167)	(0.089)	(0.061)
OPERATING_LOSS	+	-0.0833**	0.0560	0.0864*	-0.0780*
		(0.027)	(0.068)	(0.040)	(0.031)
TAX_RATE	-	0.0542***	-0.4552***	0.1347***	0.0587***
		(0.011)	(0.042)	(0.020)	(0.014)
DIV_CONST	0	-0.0099	-0.0463	0.0642**	-0.0025
		(0.010)	(0.041)	(0.021)	(0.013)
INVEST_EXPENSE	+	-0.1545	2.0165***	1.0338***	0.5151***
		(0.084)	(0.358)	(0.186)	(0.114)
LEVERAGE	+	0.1804***	0.2439*	-0.2586***	0.0661
		(0.029)	(0.110)	(0.054)	(0.039)
FP_FACTOR	-	0.0052	-5.2685***	-7.6860***	-3.6839***
		(0.217)	(0.779)	(0.468)	(0.288)
DIV_YIELD	+	0.0003	-0.0057*	-0.0034***	-0.0018***
		(0.000)	(0.003)	(0.001)	(0.000)

Table 4.24 – Continued

AGE	-	0.0113***	-0.0045	-0.0038**	0.0033***
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.1012***	0.7239***	-0.0646*	0.1498***
		(0.024)	(0.064)	(0.030)	(0.028)
EXECDIR	+	0.4414***	0.2330***	0.9109***	0.7781***
		(0.012)	(0.043)	(0.025)	(0.016)
GENDER	+	0.0363	-0.3491**	0.1054	0.0223
		(0.023)	(0.130)	(0.062)	(0.040)
TURNOVER	-	-0.3532***	-0.0399	-0.0212	-0.2253***
		(0.016)	(0.051)	(0.036)	(0.022)
RATING_DUM	?	0.0356*	0.1180*	0.0528*	0.0521**
		(0.015)	(0.046)	(0.024)	(0.018)
PRESIDENT	+	0.1817***	-0.3825***	0.2837***	0.2057***
		(0.009)	(0.038)	(0.020)	(0.012)
CONSTANT	+	3.3266***	-0.0027	0.4225	2.1704***
		(0.083)	(0.380)	(0.304)	(0.134)
Industry		Yes	Yes	Yes	Yes
Observations		24253	24253	18282	24253
Adjusted R^2		0.31	0.11	0.43	0.44

In Table 4.24, we present OLS regression results for CEOs' compensation sample. In this estimation we include interaction of *HTECH* and *IDIO_RISK* to test whether *IDIO_RISK* has a differential impact on CEOs' pay in the two groups of our sample. Positive and statistically significant coefficients of the interaction variable in CEOs' bonus and total compensation regressions confirm our findings in Table 4.23. In addition, our results also show that *IDIO_RISK* has a differential impact on CEOs' salary in high-tech and non-tech firms. However, we do not find a differential impact of *IDIO_RISK* on CEOs' equity compensation. Thus, overall our test results support the hypothesis that *IDIO_RISK* has a differential impact on CEOs' compensation in high-tech verses non-tech firms.

4.7 Idiosyncratic Risk and CEO Compensation in Investment Grade and Speculative Firms

According to hypothesis H6, there is a differential impact of *IDIO_RISK* on CEOs' pay in investment grade firms and speculative firms. To study the impact of *IDIO_RISK* in investment grade firms and speculative firms, we first test if there is a significant difference in the two groups of our sample. Table 4.25 provides a summary of variables used in the analysis of the impact of idiosyncratic risk on CEOs' compensation in investment grade and speculative firms.

The sample contains 16,255 observations in investment grade and 7,998 observations in speculative firms. On average, all components of executive pay are higher in speculative firms and the differences are statistically significant. The difference between *IDIO_RISK* in investment grade and speculative firms is 15.4% and the difference is statistically significant.

Table 4.25 Comparison of Average CEO Pay in Investment Grade and Speculative Firms: Univariate Tests

This table shows the summary statistics for our dependent and right-hand side variables in investment grade and speculative firms CEOs' compensation analysis. The sample contains 24,253 observations: 16,255 investment grade and 7,998 speculative firms, and the sample covers the period 1992 to 2009. All variables are defined in Appendix A. Difference is the average difference between investment grade and speculative firms for the given variables. Test statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	N	Investment Grade Firms	N	Speculative Firms	Average Difference	T-stat
SALARY	16255	496.30	7998	698.56	-202.3***	(-43.99)
BONUS	16255	387.53	7998	686.92	-299.4***	(-21.86)
TOTAL_COMP	16255	2676.0	7998	4926.7	-2250.6***	(-18.38)
IDIO_RISK	16255	0.3893	7998	0.2353	0.154***	(71.76)
SYS_RISK	16255	0.002913	7998	0.001947	0.000965***	(16.65)
ZSCORE_DUM	16255	0.7433	7998	0.8192	-0.0759***	(-13.22)
STOCK_RET	16255	0.1202	7998	0.05080	0.0694***	(12.10)
ROA	16255	0.1170	7998	0.1135	0.00347***	(3.43)
LSIZE	16255	6.6917	7998	8.6627	-1.971***	(-115.36)
GROWTH_OPPORT	16255	2.1118	7998	1.9326	0.179***	(8.14)
CASH_SHORTFALL	16255	-0.1881	7998	-0.1676	-0.0205***	(-12.34)
OPERATING_LOSS	16255	0.09111	7998	0.02713	0.0640***	(18.49)
TAX_RATE	16255	0.2968	7998	0.2372	0.0596***	(9.78)
DIV_CONST	16255	0.7797	7998	0.4887	0.291***	(47.93)
INVEST_EXPENSE	16255	0.05589	7998	0.05238	0.00351***	(4.64)
LEVERAGE	16255	0.4941	7998	0.6123	-0.118***	(-42.33)
FP_FACTOR	16255	-0.01471	7998	-0.01467	-0.00005	(-0.08)
DIV_YIELD	16255	0.7465	7998	7.2809	-6.534***	(-33.48)
AGE	16255	53.517	7998	54.430	-0.913***	(-8.36)
DUALITY	16255	0.8935	7998	0.9357	-0.0422***	(-10.69)
EXECDIR	16255	0.8358	7998	0.7718	0.0640***	(12.09)
GENDER	16255	0.02227	7998	0.01800	0.00427*	(2.19)
TURNOVER	16255	0.1165	7998	0.1059	0.0106*	(2.44)
RATING_DUM	16255	0.2843	7998	1.000	-0.716***	(-141.9)
PRESIDENT	16255	0.4752	7998	0.4166	0.0586***	(8.63)

Table 4.26 reports results from OLS regression of CEOs' compensation for investment grade and speculative firms. Panel A in Table 4.23 presents estimation results for CEOs' compensation in investment grade firms. Positive and statistically significant coefficients of

IDIO_RISK show that there is a positive effect of *IDIO_RISK* on CEOs' salary, bonuses, equity and total compensation in investment grade firms.

Panel B in Table 4.26 presents the regression results for speculative firms. Coefficients for *IDIO_RISK* are positive and statistically significant in CEOs' bonuses, equity and total compensation, supporting our H1. Similarly, *ZSCORE_DUM* also has a positive effect on all components of CEOs' pay in our speculative firms' sample.

Table 4.26 CEO Compensation and Idiosyncratic Risk: OLS Regression Results for Investment Grade and Speculative Firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in investment grade and speculative firms. Panel A (Panel B) shows regression results for CEOs' compensation in investment grade (speculative) firms. In both panels dependent variables are CEO salary, bonuses, equity pay, and total compensation. The investment grade firms sample contains 7,998 observations and speculative firms sample contains 16,255 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.31355**	6.01592***	3.68187***	2.39296***
		(0.096)	(0.420)	(0.193)	(0.126)
SYS_RISK	+	-1.80569	-67.63428***	38.49505***	17.06774***
		(2.486)	(10.920)	(4.881)	(3.269)
ZSCORE_DUM	+	0.14520***	0.10604	0.29885***	0.24983***
		(0.020)	(0.089)	(0.043)	(0.027)
STOCK_RET	+	-0.01062	0.47042***	-0.17017***	0.02252
		(0.022)	(0.096)	(0.044)	(0.029)
ROA	+	1.03537***	6.05186***	0.07150	1.14402***
		(0.176)	(0.772)	(0.349)	(0.231)
LSIZE	+	0.20702***	0.44628***	0.60665***	0.46131***
		(0.007)	(0.029)	(0.014)	(0.009)
GROWTH_OPPORT	+	-0.02854**	-0.14460***	0.08061***	0.01011
		(0.010)	(0.043)	(0.020)	(0.013)
CASH_SHORTFALL	+	0.22151**	1.49521***	0.22485	0.46180***
		(0.078)	(0.345)	(0.157)	(0.103)
OPERATING_LOSS	-	-0.00219	0.28322	0.23066**	0.08576
		(0.042)	(0.186)	(0.089)	(0.056)
TAX_RATE	0	0.05191**	-0.24403***	0.19603***	0.10710***
		(0.016)	(0.070)	(0.032)	(0.021)
DIV_CONST	+	0.05057***	0.10657	-0.01180	0.06359***
		(0.014)	(0.061)	(0.028)	(0.018)
INVEST_EXPENSE	+	-0.08102	2.35802**	1.10261**	0.83045***
		(0.170)	(0.747)	(0.345)	(0.224)
LEVERAGE	-	0.11578*	0.98460***	-0.12088	0.23947***
		(0.053)	(0.232)	(0.106)	(0.069)
FP_FACTOR	+	-1.18886**	-9.09139***	-11.18147***	-7.33206***
		(0.403)	(1.768)	(0.824)	(0.529)

Table 4.26 – Continued

DIV_YIELD	-	-0.00002	-0.00601***	-0.00284***	-0.00109*
		(0.000)	(0.002)	(0.001)	(0.001)
AGE	+	0.01272***	0.00190	0.00419*	0.01086***
		(0.001)	(0.004)	(0.002)	(0.001)
DUALITY	+	-0.01268	0.79443***	-0.08122	0.05976
		(0.027)	(0.118)	(0.055)	(0.035)
EXECDIR	+	0.50724***	0.39151***	0.95016***	0.83400***
		(0.017)	(0.076)	(0.036)	(0.023)
GENDER	-	0.05395	-0.37760	0.00096	0.07351
		(0.050)	(0.218)	(0.100)	(0.065)
TURNOVER	?	-0.37460***	0.15149	-0.24757***	-0.34446***
		(0.022)	(0.098)	(0.049)	(0.029)
PRESIDENT	+	0.17339***	-0.64565***	0.32319***	0.22621***
		(0.014)	(0.063)	(0.029)	(0.019)
CONSTANT	+	3.14554***	-2.17311***	-0.61787**	1.27973***
		(0.095)	(0.419)	(0.200)	(0.125)
Observations		7998	7998	6547	7998
Adjusted R^2		0.35	0.09	0.48	0.53

Relation between CEO Compensation and Idiosyncratic Volatility - Speculative Firms

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.03681	1.11693***	1.25095***	0.78289***
		(0.035)	(0.131)	(0.068)	(0.046)
SYS_RISK	+	1.53462	-21.61220***	22.08923***	8.88961***
		(1.243)	(4.604)	(2.444)	(1.634)
ZSCORE_DUM	+	0.09145***	0.15417**	0.06980**	0.12507***
		(0.013)	(0.048)	(0.027)	(0.017)
STOCK_RET	+	0.02195	0.77788***	-0.22220***	-0.01618
		(0.013)	(0.046)	(0.025)	(0.016)
ROA	+	0.76058***	5.88695***	0.21269	0.97160***
		(0.093)	(0.343)	(0.190)	(0.122)
LSIZE	+	0.17068***	0.37729***	0.63847***	0.45564***
		(0.005)	(0.020)	(0.011)	(0.007)
GROWTH_OPPORT	+	-0.01687***	-0.05129**	0.07033***	0.02658***
		(0.004)	(0.017)	(0.009)	(0.006)
CASH_SHORTFALL	+	0.16846***	1.13472***	-0.35585***	0.14975*
		(0.050)	(0.185)	(0.101)	(0.066)
OPERATING_LOSS	-	-0.08575***	0.07531	0.12702**	-0.05373*
		(0.021)	(0.077)	(0.043)	(0.027)
TAX_RATE	0	0.06921***	-0.44410***	0.19611***	0.10815***
		(0.013)	(0.047)	(0.025)	(0.017)
DIV_CONST	+	-0.01615	-0.01140	0.17714***	0.01981
		(0.014)	(0.052)	(0.028)	(0.018)
INVEST_EXPENSE	+	-0.33557**	1.89915***	0.79644***	0.30832*
		(0.108)	(0.399)	(0.214)	(0.142)
LEVERAGE	-	0.17599***	0.16572	-0.52920***	-0.06040
		(0.028)	(0.105)	(0.060)	(0.037)
FP_FACTOR	+	0.29619	-3.53317***	-9.42092***	-3.94748***
		(0.219)	(0.810)	(0.440)	(0.288)
DIV_YIELD	-	-0.00011	-0.00360*	-0.00648**	-0.00259***
		(0.000)	(0.002)	(0.002)	(0.001)

Table 4.26 – Continued

AGE	+	0.01058***	-0.00529*	-0.00798***	0.00019
		(0.001)	(0.003)	(0.002)	(0.001)
DUALITY	+	0.11784***	0.73820***	-0.08375*	0.16749***
		(0.018)	(0.067)	(0.038)	(0.024)
EXECDIR	+	0.40870***	0.13241*	0.89902***	0.75312***
		(0.016)	(0.060)	(0.034)	(0.021)
GENDER	-	0.09845**	-0.45123**	0.22700**	0.02778
		(0.038)	(0.141)	(0.078)	(0.050)
TURNOVER	?	-0.34348***	-0.10684	0.13775***	-0.14776***
		(0.018)	(0.067)	(0.038)	(0.024)
PRESIDENT	+	0.19372***	-0.27855***	0.21139***	0.17877***
		(0.012)	(0.044)	(0.024)	(0.016)
CONSTANT		3.64005***	0.12604	1.03714***	2.68401***
		(0.063)	(0.232)	(0.129)	(0.082)
Observations		16255	16255	11735	16255
Adjusted R^2		0.22	0.08	0.35	0.32
Wald test of the coefficient of idiosyncratic risk in two regressions: Chi-squared and (p-value)		2.44 (.118)	96.46*** (000)	81.02*** (000)	49.82*** (000)

We use Wald test to examine whether the coefficient on *IDIO_RISK* is statistically different across the two groups. The chi-squared test statistics (p-values) for salary, bonuses, equity and total pay regressions are 2.44 (0.12), 96.46 (0.000), 81.02 (000) and 49.82 (0.000), respectively. The Wald test results suggest that the impact of *IDIO_RISK* on CEOs' bonus, equity and total pay is significantly different in investment grade and speculative firms. However, the test results show that there is no statistically significant differential impact of *IDIO_RISK* on CEOs' salary compensation in the two groups. Therefore, we conduct further examination using the interaction term of *IDIO_RISK* and *INVEST_DUM* in OLS regression model.

Table 4.27 Differential Impact of Idiosyncratic Risk on CEO Compensation: OLS Regressions for Investment Grade and Speculative Firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in high-tech and non-tech firms. The table shows OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample contains 24,253 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0796**	1.5431***	1.3630***	0.8684***
		(0.029)	(0.192)	(0.164)	(0.081)
INVEST_DUM	+	-0.0330*	0.3625***	-0.3766***	-0.1322***
		(0.016)	(0.059)	(0.029)	(0.020)

Table 4.27 – Continued

*INVEST_DUM*IVOL*	+/-	-0.0367	-0.1464	0.4701***	0.2058***
		(0.052)	(0.137)	(0.075)	(0.062)
SYS_RISK	+	0.8332	-24.9654***	27.5347***	11.3855***
		(1.543)	(4.940)	(2.704)	(2.293)
ZSCORE_DUM	+	0.1183***	0.1632***	0.1442***	0.1862***
		(0.012)	(0.042)	(0.023)	(0.015)
STOCK_RET	+	0.0085	0.7114***	-0.2212***	-0.0191
		(0.012)	(0.042)	(0.022)	(0.016)
ROA	+	0.8251***	5.9205***	0.3685*	1.1299***
		(0.080)	(0.335)	(0.181)	(0.125)
LSIZE	+	0.1816***	0.4060***	0.5994***	0.4513***
		(0.008)	(0.020)	(0.010)	(0.008)
GROWTH_OPPORT	-	-0.0192***	-0.0622***	0.0697***	0.0222**
		(0.005)	(0.015)	(0.012)	(0.008)
CASH_SHORTFALL	+	0.1768***	1.1301***	-0.2963***	0.1846**
		(0.052)	(0.162)	(0.086)	(0.059)
OPERATING_LOSS	+	-0.0777**	0.0927	0.1137**	-0.0519
		(0.027)	(0.068)	(0.040)	(0.030)
TAX_RATE	-	0.0663***	-0.3664***	0.1947***	0.1123***
		(0.011)	(0.041)	(0.019)	(0.013)
DIV_CONST	0	0.0141	0.0825*	0.0978***	0.0502***
		(0.010)	(0.041)	(0.021)	(0.013)
INVEST_EXPENSE	+	-0.2814**	1.9319***	0.8902***	0.4318***
		(0.089)	(0.350)	(0.185)	(0.115)
LEVERAGE	+	0.1239***	0.2655*	-0.5125***	-0.0662
		(0.028)	(0.108)	(0.056)	(0.038)
FP_FACTOR	-	-0.2496	-4.6961***	-9.7899***	-4.7360***
		(0.212)	(0.759)	(0.439)	(0.292)
DIV_YIELD	+	0.0004	-0.0056*	-0.0033***	-0.0016***
		(0.000)	(0.003)	(0.001)	(0.000)
AGE	-	0.0113***	-0.0033	-0.0045***	0.0032***
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.0848***	0.7410***	-0.0820**	0.1406***
		(0.024)	(0.064)	(0.030)	(0.028)
EXECDIR	+	0.4480***	0.2372***	0.9241***	0.7888***
		(0.012)	(0.043)	(0.026)	(0.017)
GENDER	+	0.0849***	-0.4274***	0.1533*	0.0433
		(0.023)	(0.128)	(0.062)	(0.040)
TURNOVER	-	-0.3504***	-0.0459	0.0005	-0.2154***
		(0.016)	(0.051)	(0.037)	(0.022)
RATING_DUM	?	0.0508**	-0.0426	0.2323***	0.1130***
		(0.017)	(0.056)	(0.028)	(0.020)
PRESIDENT	+	0.1840***	-0.3750***	0.2586***	0.1957***
		(0.009)	(0.038)	(0.020)	(0.013)
CONSTANT	?	3.4730***	-0.5049*	0.9110***	2.3729***
		(0.057)	(0.216)	(0.132)	(0.076)
Observations		24253	24253	18282	24253
Adjusted R^2		0.29	0.10	0.41	0.42

In Table 4.27, we present OLS regression results for our CEOs' compensation sample in investment grade and speculative firms. In this estimation, we include interaction of *INVEST_DUM* and *IDIO_RISK* to test whether *IDIO_RISK* has a differential impact on CEOs' pay in the two groups of our sample. Positive and statistically significant coefficients of the interaction variable in CEOs' equity and total compensation regressions confirm our findings in Table 4.26. However, the regression results do not show a statistically different impact of *IDIO_RISK* on CEOs' salary and bonus compensation in speculative and investment grade firms. Overall, our test results show that *IDIO_RISK* has a differential impact on CEOs' compensation, supporting our hypothesis.

4.8 Idiosyncratic Risk and CEO Compensation in Recession and Normal Business Cycle

We further study CEOs' compensation in two subsets of our sample: firms in a recession and in a normal business cycle. We examine whether the impact of *IDIO_RISK* on CEOs' salary, bonuses, equity and total pay is different between these two subsets of our sample for three reasons. First, during a recession CEOs are more entrenched than during a normal business cycle. Second, firms get more attention from policy makers, investors, the public and the media during a recession, which works as a strong monitoring tool. Third, a firm's performance during a recession does not support substantial increases in top executives' pay and benefits. Therefore, we expect the impact of *IDIO_RISK* on CEOs' pay to be different between a normal business cycle and a recession.

In Table 4.28, we compare average CEOs' pay and the explanatory variables between firms in a recession and in a normal business cycle. Contrary to our expectation, summary statistics show that CEOs receive higher salary, equity and total compensation during a recession than during a normal business cycle. Only bonus pay decreases during a recession. These differences are statistically significant. The average *IDIO_RISK* difference in these two periods is 3.45%, and it is statistically significant. It is very interesting to note that a firm's market performance during a recession is about 3.85% higher than in a normal business cycle.

Table 4.28 Comparison of Average CEO Pay in Normal Business Cycle and in Recession: Univariate Tests

This table shows the summary statistics for our dependent and right-hand side variables in CEOs' compensation analysis during a recession and during a normal business cycle. The sample contains 24,253 observations: 21,487 CEOs in a normal economic cycle and 2,766 CEOs in a recession, and the sample covers the period 1992 to 2009. All variables are defined in Appendix A. Difference is the average difference between a recession and a normal business cycle for the given variables. Test statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	N	Normal Period	N	Recession Period	Difference	T-stat
SALARY	21487	547.75	2766	681.43	-133.7***	(-19.06)
BONUS	21487	504.00	2766	348.50	155.5***	(7.61)
EQUITY_COMP	21456	1997.1	2766	2884.9	-887.8***	(-5.15)
TOTAL_COMP	21487	3332.2	2766	4086.9	-754.7***	(-4.14)
IDIO_RISK	21487	0.3346	2766	0.3691	-0.0345***	(-9.90)
SYS_RISK	21487	0.002141	2766	0.006115	-0.0034***	(-48.23)
ZSCORE_DUM	21487	0.7709	2766	0.7484	0.0225**	(2.64)
STOCK_RET	21487	0.09296	2766	0.1314	-0.0385***	(-4.52)
ROA	21487	0.1172	2766	0.1049	0.0124***	(8.28)
LSIZE	21487	7.3037	2766	7.6371	-0.333***	(-10.63)
GROWTH_OPPORT	21487	2.0744	2766	1.8843	0.190***	(5.83)
CASH_SHORTFALL	21487	-0.1810	2766	-0.1838	0.00285	(1.16)
OPERATING_LOSS	21487	0.07279	2766	0.04845	0.0243***	(4.72)
TAX_RATE	21487	0.2648	2766	0.3735	-0.109***	(-12.06)
DIV_CONST	21487	0.6914	2766	0.6240	0.0674***	(7.19)
INVEST_EXPENSE	21487	0.05530	2766	0.05033	0.00497***	(4.44)
LEVERAGE	21487	0.5333	2766	0.5316	0.00164	(0.38)
FP_FACTOR	21487	-0.01553	2766	-0.008248	-0.0073***	(-9.09)
DIV_YIELD	21487	2.7525	2766	4.0578	-1.305***	(-4.42)
AGE	21487	53.740	2766	54.423	-0.683***	(-4.22)
DUALITY	21487	0.9143	2766	0.8539	0.0604***	(10.34)
EXECDIR	21487	0.8122	2766	0.8344	-0.0223**	(-2.84)
GENDER	21487	0.01964	2766	0.03037	-0.0107***	(-3.72)
TURNOVER	21487	0.1191	2766	0.06508	0.0541***	(8.47)
RATING_DUM	21487	0.5170	2766	0.5463	-0.0293**	(-2.90)
PRESIDENT	21487	0.4307	2766	0.6515	-0.221***	(-22.16)

Table 4.29 presents the coefficients and standard errors obtained from OLS regressions of CEOs' salary, bonuses, equity and total compensation for firms during a normal business cycle and during a recession (Panel A and B, respectively). We find that *IDIO_RISK* has a positive impact on CEOs' bonus, equity and total pay for firms in a recession. For firms in a normal business cycle, the coefficient on *IDIO_RISK* is positively related to all components of CEOs' pay.

Table 4.29 CEO Compensation and Idiosyncratic Risk: OLS Regression Results for Firms in Normal Business Cycle and Recession

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility during a recession and during a normal business cycle. Panel A (Panel B) shows regression results for CEOs' compensation during a recession (normal business cycle). In both panels dependent variables are CEOs' salary, bonuses, equity pay, and total compensation. The recession sample contains 2,766 observations and the normal business cycle sample contains 21,487 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: CEO Compensation and Idiosyncratic Risk during Recession					
Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	-0.09912	1.68634***	0.67753***	0.48959***
		(0.109)	(0.326)	(0.146)	(0.124)
SYS_RISK	+	-4.22346	-8.10782	10.51889**	-0.20879
		(2.492)	(7.465)	(3.513)	(2.827)
ZSCORE_DUM	+	0.16942***	0.01272	0.05264	0.18766***
		(0.041)	(0.122)	(0.057)	(0.046)
STOCK_RET	+	-0.05518	0.94212***	-0.24860***	-0.14554***
		(0.039)	(0.116)	(0.054)	(0.044)
ROA	+	0.94029**	3.11808**	1.11787*	1.08641**
		(0.336)	(1.008)	(0.474)	(0.381)
LSIZE	+	0.13782***	0.38834***	0.53152***	0.38397***
		(0.017)	(0.052)	(0.024)	(0.020)
GROWTH_OPPORT	+	-0.08981***	0.09635	0.07761	0.02192
		(0.027)	(0.081)	(0.040)	(0.031)
CASH_SHORTFALL	+	0.03637	-0.06156	-0.41832	-0.09248
		(0.172)	(0.515)	(0.241)	(0.195)
OPERATING_LOSS	-	-0.01332	0.38719	0.43614***	0.13762
		(0.086)	(0.257)	(0.117)	(0.097)
TAX_RATE	*0*	0.03498	-0.35083**	0.18226***	0.11098**
		(0.037)	(0.110)	(0.051)	(0.042)
DIV_CONST	+	0.07863*	-0.04171	0.09685	0.04107
		(0.039)	(0.117)	(0.053)	(0.044)
INVEST_EXPENSE	+	-0.76376*	2.70908*	-1.06237*	0.21247
		(0.356)	(1.066)	(0.516)	(0.404)
LEVERAGE	-	0.15086	0.15931	-0.62627***	-0.14292
		(0.097)	(0.289)	(0.141)	(0.110)
FP_FACTOR	+	-0.62194	-2.55411	-7.93758***	-4.20616***
		(0.763)	(2.287)	(1.120)	(0.866)
DIV_YIELD	-	0.00063	-0.00613*	-0.00035	-0.00012
		(0.001)	(0.003)	(0.001)	(0.001)
AGE	+	0.01033***	0.00165	-0.01007**	-0.00280
		(0.002)	(0.007)	(0.004)	(0.003)
DUALITY	+	0.14528**	0.13398	-0.03121	0.12496*
		(0.050)	(0.150)	(0.070)	(0.057)
EXECDIR	+	0.43994***	0.02749	1.05220***	0.89870***
		(0.050)	(0.150)	(0.070)	(0.057)
GENDER	-	0.10457	-0.28883	0.14835	0.05844
		(0.101)	(0.302)	(0.140)	(0.114)

Table 4.29 – Continued

TURNOVER	?	-0.33956***	0.81428***	0.34314**	0.06460
		(0.073)	(0.219)	(0.105)	(0.083)
RATING_DUM	+	0.07627	0.20386	0.23520***	0.22474***
		(0.049)	(0.147)	(0.068)	(0.056)
PRESIDENT	+	-0.16292***	2.64530***	0.01281	0.06920
		(0.041)	(0.124)	(0.057)	(0.047)
CONSTANT		4.21002***	-3.41221***	2.23677***	3.33744***
		(0.207)	(0.621)	(0.289)	(0.235)
Observations		2766	2766	2247	2766
Adjusted R^2		0.16	0.23	0.40	0.32

Panel B: CEO Compensation and Idiosyncratic Risk during Normal Business Cycle

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.12641***	1.04113***	1.72372***	0.99736***
		(0.032)	(0.127)	(0.068)	(0.044)
SYS_RISK	+	1.12551	23.51460***	33.32612***	20.11008***
		(1.366)	(5.384)	(2.892)	(1.873)
ZSCORE_DUM	+	0.11405***	0.17531***	0.13328***	0.17637***
		(0.011)	(0.042)	(0.024)	(0.015)
STOCK_RET	+	-0.00269	0.90949***	-0.22614***	0.00365
		(0.011)	(0.043)	(0.024)	(0.015)
ROA	+	0.84585***	6.33042***	0.12973	1.07611***
		(0.080)	(0.315)	(0.176)	(0.110)
LSIZE	+	0.17767***	0.50184***	0.57507***	0.44753***
		(0.004)	(0.017)	(0.010)	(0.006)
GROWTH_OPPORT	+	-0.01522***	-0.09224***	0.07731***	0.02439***
		(0.004)	(0.015)	(0.008)	(0.005)
CASH_SHORTFALL	+	0.20719***	1.11329***	-0.27659**	0.20155***
		(0.042)	(0.165)	(0.090)	(0.057)
OPERATING_LOSS	-	-0.07859***	-0.01864	0.08745*	-0.07171**
		(0.018)	(0.071)	(0.040)	(0.025)
TAX_RATE	*0*	0.04783***	-0.16839***	0.19503***	0.11404***
		(0.010)	(0.040)	(0.022)	(0.014)
DIV_CONST	+	0.01445	-0.02597	0.16177***	0.06958***
		(0.010)	(0.040)	(0.022)	(0.014)
INVEST_EXPENSE	+	-0.09023	0.59542	1.21790***	0.45591***
		(0.091)	(0.358)	(0.194)	(0.125)
LEVERAGE	-	0.15211***	-0.01748	-0.41975***	-0.03609
		(0.025)	(0.098)	(0.056)	(0.034)
FP_FACTOR	+	-0.38340*	-3.30822***	-10.03130***	-4.76527***
		(0.188)	(0.742)	(0.407)	(0.258)
DIV_YIELD	-	0.00016	-0.00320*	-0.00550***	-0.00206***
		(0.000)	(0.001)	(0.001)	(0.000)
AGE	+	0.01133***	-0.00185	-0.00448***	0.00376***
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.10293***	0.56702***	-0.06321	0.14881***
		(0.016)	(0.062)	(0.035)	(0.021)
EXECDIR	+	0.44119***	0.34357***	0.91914***	0.78145***
		(0.012)	(0.047)	(0.027)	(0.016)
GENDER	-	0.06923*	-0.28637*	0.13021	0.04318
		(0.031)	(0.124)	(0.069)	(0.043)

Table 4.29 – Continued

TURNOVER	?	-0.35284***	-0.10892*	-0.02519	-0.23412***
		(0.014)	(0.055)	(0.032)	(0.019)
RATING_DUM	+	0.04220***	0.00068	0.02883	0.02898
		(0.012)	(0.046)	(0.025)	(0.016)
PRESIDENT	+	0.22560***	-0.67297***	0.32295***	0.22122***
		(0.009)	(0.037)	(0.020)	(0.013)
CONSTANT	?	3.41916***	-0.51224*	0.80878***	2.28690***
		(0.051)	(0.201)	(0.114)	(0.070)
Observations		21487	21487	16035	21487
Adjusted R^2		0.32	0.12	0.40	0.43
Wald test of the coefficient of idiosyncratic risk in two regressions: Chi-squared and (p-value)		4.71** (0.03)	2.47 (.116)	10.26*** (.001)	8.29*** (.004)

We use the Wald test to examine whether the coefficient on *IDIO_RISK* is statistically different across the two groups. The chi-squared test statistics (p-values) for salary, bonuses, equity and total compensation regressions are 2.44 (0.12), 96.46 (0.000), 81.02 (000) and 49.82 (0.000), respectively. These results suggest that *IDIO_RISK* has differential impacts on average CEOs' salary, equity and total compensation between firms during a recession versus a normal business cycle, supporting our H6.

Table 4.30 Differential Impact of Idiosyncratic Risk on CEO Compensation: OLS Regressions for Firms in Normal Business Cycle and Recession

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in normal and recession periods. The table shows OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample contains 24,253 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.1338***	0.9885***	1.7928***	1.0467***
		(0.029)	(0.165)	(0.198)	(0.089)
REC_DUM	+	0.1958***	-2.4212***	0.7024***	0.2446***
		(0.034)	(0.208)	(0.075)	(0.045)
*REC_DUM*IVOL*	+/-	-0.3383***	2.3666***	-1.3848***	-0.6641***
		(0.096)	(0.557)	(0.198)	(0.124)
SYS_RISK	+	-0.2592	6.9171	24.8252***	12.3477***
		(1.553)	(5.105)	(2.703)	(2.309)
ZSCORE_DUM	+	0.1175***	0.1829***	0.1197***	0.1765***
		(0.012)	(0.041)	(0.024)	(0.016)
STOCK_RET	+	0.0080	0.7583***	-0.2192***	-0.0168
		(0.012)	(0.041)	(0.023)	(0.016)
ROA	+	0.8387***	6.0097***	0.2418	1.0770***
		(0.080)	(0.326)	(0.185)	(0.123)

Table 4.30 – Continued

LSIZE	+	0.1782***	0.4490***	0.5722***	0.4432***
		(0.007)	(0.018)	(0.011)	(0.008)
GROWTH_OPPORT	-	-0.0192***	-0.0653***	0.0755***	0.0242**
		(0.005)	(0.014)	(0.014)	(0.008)
CASH_SHORTFALL	+	0.1809***	1.0690***	-0.3018***	0.1755**
		(0.052)	(0.159)	(0.087)	(0.059)
OPERATING_LOSS	+	-0.0797**	0.0586	0.1183**	-0.0544
		(0.027)	(0.067)	(0.041)	(0.031)
TAX_RATE	-	0.0634***	-0.3341***	0.2088***	0.1186***
		(0.010)	(0.040)	(0.019)	(0.013)
DIV_CONST	0	0.0213*	-0.0195	0.1546***	0.0665***
		(0.010)	(0.040)	(0.022)	(0.013)
INVEST_EXPENSE	+	-0.2615**	1.5826***	0.9292***	0.4189***
		(0.090)	(0.348)	(0.188)	(0.115)
LEVERAGE	+	0.1359***	0.1428	-0.4529***	-0.0510
		(0.028)	(0.104)	(0.055)	(0.037)
FP_FACTOR	-	-0.1994	-4.1398***	-9.6977***	-4.6957***
		(0.211)	(0.723)	(0.461)	(0.282)
DIV_YIELD	+	0.0003	-0.0047*	-0.0038***	-0.0017***
		(0.000)	(0.002)	(0.001)	(0.000)
AGE	-	0.0114***	-0.0030	-0.0051***	0.0030***
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.0901***	0.6560***	-0.0800**	0.1377***
		(0.024)	(0.062)	(0.031)	(0.029)
EXECDIR	+	0.4469***	0.2446***	0.9363***	0.7932***
		(0.012)	(0.043)	(0.026)	(0.017)
GENDER	+	0.0827***	-0.3737**	0.1405*	0.0453
		(0.024)	(0.126)	(0.065)	(0.040)
TURNOVER	-	-0.3473***	-0.1187*	0.0064	-0.2160***
		(0.016)	(0.051)	(0.037)	(0.022)
RATING_DUM	?	0.0371*	0.1007*	0.0473	0.0478**
		(0.015)	(0.045)	(0.025)	(0.018)
PRESIDENT	+	0.1817***	-0.2722***	0.2765***	0.2073***
		(0.009)	(0.038)	(0.021)	(0.013)
CONSTANT	?	3.4536***	-0.3697	0.8974***	2.3589***
		(0.057)	(0.208)	(0.149)	(0.080)
Observations		24253	24253	18282	24253
Adjusted R^2		0.29	0.13	0.40	0.42

In Table 4.30, we present OLS regression results of CEOs' compensation. In this estimation we include interaction of *REC_DUM* and *IDIO_RISK* to test whether *IDIO_RISK* has a differential impact on CEOs' pay in the two groups of our sample. Negative and statistically significant coefficients of the interaction variable on CEOs' salary, equity and total compensation regressions and a positive coefficient for CEOs' bonus regression confirm our findings in Table 4.29. Thus, our test results support our hypothesis that *IDIO_RISK* has a differential impact on CEOs' compensation between recession and normal business cycle periods.

4.9 Idiosyncratic Risk and CEO Compensation and Governance

Prior research finds that corporate governance is one of the important determinants of CEOs' compensation. Therefore, we examine whether *IDIO_RISK* has a differential impact on CEOs' pay in firms with good and poor governance. We use the EINDEX constructed by Bebchuk, Fried, and Walker (2009) as a proxy for corporate governance. In firms with poor governance, CEOs have stronger managerial power. Therefore, we expect *IDIO_RISK* to have a differential impact on CEOs' pay in these two subsets of our sample.

Table 4.31 Comparison of Average CEO Pay in Good and Poor Governance Firms: Univariate Tests

This table shows the summary statistics for our dependent and right-hand side variables in CEOs' compensation and idiosyncratic risk analysis between firms with good governance and poor governance. The sample contains 24,253 observations: 7,038 CEOs in firms with good governance and 17,215 CEOs in firms with poor governance, and the sample covers the period 1992 to 2009. All variables are defined in Appendix A. Difference is the average difference between good governance and poor governance firms for the given variables. Test statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	N	Poor Governance	N	Good Governance	Difference	t-stat
SALARY	17215	543.29	7038	611.22	-67.93***	(-13.78)
BONUS	17215	442.85	7038	592.45	-149.6***	(-10.47)
EQUITY_COMP	17193	1770.6	7029	2900.4	-1129.8***	(-9.36)
TOTAL_COMP	17215	3113.6	7038	4511.3	-1397.6***	(-9.01)
IDIO_RISK	17215	0.3411	7038	0.3321	0.00900***	(3.68)
SYS_RISK	17215	0.002624	7038	0.002523	0.000101	(1.67)
ZSCORE_DUM	17215	0.7713	7038	0.7610	0.0103	(1.72)
STOCK_RET	17215	0.1037	7038	0.08187	0.0218***	(3.66)
ROA	17215	0.1131	7038	0.1226	-0.0095***	(-9.13)
LSIZE	17215	7.1776	7038	7.7431	-0.566***	(-26.03)
GROWTH_OPPORT	17215	1.9782	7038	2.2350	-0.257***	(-11.27)
CASH_SHORTFALL	17215	-0.1777	7038	-0.1901	0.0124***	(7.20)
OPERATING_LOSS	17215	0.08034	7038	0.04476	0.0356***	(9.87)
TAX_RATE	17215	0.2801	7038	0.2700	0.0101	(1.60)
DIV_CONST	17215	0.6993	7038	0.6458	0.0535***	(8.14)
INVEST_EXPENSE	17215	0.05677	7038	0.04975	0.00702***	(8.98)
LEVERAGE	17215	0.5374	7038	0.5224	0.0150***	(5.01)
FP_FACTOR	17215	-0.01216	7038	-0.02092	0.00876***	(15.67)
DIV_YIELD	17215	1.9341	7038	5.2673	-3.333***	(-16.21)
AGE	17215	53.740	7038	54.007	-0.267*	(-2.36)

Table 4.31 – Continued

DUALITY	17215	0.9112	7038	0.8983	0.0129**	(3.15)
EXECDIR	17215	0.8190	7038	0.8042	0.0148**	(2.69)
GENDER	17215	0.02056	7038	0.02160	-0.00103	(-0.51)
TURNOVER	17215	0.1190	7038	0.09818	0.0208***	(4.66)
RATING_DUM	17215	0.5073	7038	0.5521	-0.0448***	(-6.34)
PRESIDENT	17215	0.4380	7038	0.4996	-0.0615***	(-8.74)

In Table 4.31, we compare average CEOs' salary, bonuses, equity and total compensation and explanatory variables between good and poor governance firms. All components of CEOs' pay are statistically different in these two groups. Similarly, these firms have different risk and performance characteristics. For instance, both risk and return are lower for good governance firms and the differences are statistically significant.

Table 4.32 CEO Compensation and Idiosyncratic Risk: OLS Regression Results for Good and Poor Governance Firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in firms with good governance and poor governance. Panel A (Panel B) shows regression results for CEOs' compensation in firms with good governance (poor governance). In both panels dependent variables are CEOs' salary, bonuses, equity pay, and total compensation. The good governance sample contains 7,038 observations and the poor governance sample contains 17,225 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Panel A: Relationship between CEO Compensation and Idiosyncratic Volatility - Firms with Good Governance

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.13375*	0.93156***	0.98811***	0.77867***
		(0.058)	(0.183)	(0.092)	(0.071)
SYS_RISK	+	-2.57145	-19.75575*	40.23723***	16.73729***
		(2.751)	(8.703)	(4.588)	(3.372)
ZSCORE_DUM	+	0.10013***	0.11193	0.12297**	0.18149***
		(0.024)	(0.076)	(0.043)	(0.029)
STOCK_RET	+	-0.00620	0.58082***	-0.18463***	-0.04069
		(0.025)	(0.080)	(0.044)	(0.031)
ROA	+	0.95452***	5.70564***	-0.11319	1.07558***
		(0.185)	(0.585)	(0.323)	(0.227)
LSIZE	+	0.13029***	0.42522***	0.48956***	0.39403***
		(0.009)	(0.029)	(0.017)	(0.011)
GROWTH_OPPORT	+	-0.02418*	-0.08079*	0.10807***	0.02018
		(0.010)	(0.032)	(0.017)	(0.012)
CASH_SHORTFALL	+	0.18815*	1.17442***	-0.46548**	0.04572
		(0.093)	(0.295)	(0.162)	(0.114)
OPERATING_LOSS	-	-0.25333***	0.29057	0.22672*	0.05229
		(0.051)	(0.162)	(0.090)	(0.063)

Table 4.32 – Continued

TAX_RATE	0	0.03742	-0.12011	0.28424***	0.11196***
		(0.023)	(0.074)	(0.040)	(0.029)
DIV_CONST	+	-0.02065	-0.01086	0.18575***	0.07996**
		(0.022)	(0.070)	(0.039)	(0.027)
INVEST_EXPENSE	+	-0.39940	1.26048	0.67543	0.19975
		(0.240)	(0.758)	(0.406)	(0.294)
LEVERAGE	-	0.31515***	0.05992	-0.27424**	0.13140
		(0.057)	(0.180)	(0.102)	(0.070)
FP_FACTOR	+	-0.28240	-4.38747**	-9.87701***	-5.00075***
		(0.447)	(1.415)	(0.782)	(0.548)
DIV_YIELD	-	0.00098*	-0.00329*	-0.00079	-0.00047
		(0.000)	(0.001)	(0.001)	(0.001)
AGE	+	0.01272***	-0.01071**	-0.00133	0.00444**
		(0.001)	(0.004)	(0.002)	(0.002)
DUALITY	+	0.17981***	0.64304***	-0.14569*	0.18584***
		(0.033)	(0.105)	(0.058)	(0.041)
EXECDIR	+	0.42658***	0.39832***	0.94549***	0.80161***
		(0.027)	(0.086)	(0.048)	(0.033)
GENDER	-	0.02198	-0.73228***	0.16929	0.03287
		(0.069)	(0.217)	(0.125)	(0.084)
TURNOVER	?	-0.37746***	-0.17406	-0.01620	-0.22683***
		(0.035)	(0.109)	(0.063)	(0.042)
RATING_DUM	+	0.10296***	0.26245**	0.14665**	0.16160***
		(0.028)	(0.088)	(0.048)	(0.034)
PRESIDENT	+	0.17191***	-0.38934***	0.36423***	0.21552***
		(0.021)	(0.067)	(0.037)	(0.026)
CONSTANT		3.61840***	0.24185	1.27266***	2.46140***
		(0.111)	(0.352)	(0.198)	(0.136)
Observations		7038	7038	5239	7038
Adjusted R^2		0.20	0.10	0.38	0.36

Panel B: Relationship between CEO Compensation and Idiosyncratic Volatility - Firms with Poor Governance

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.08017*	1.70705***	2.21995***	1.12861***
		(0.037)	(0.165)	(0.086)	(0.052)
SYS_RISK	+	1.98150	-29.65891***	19.94044***	8.73754***
		(1.104)	(4.859)	(2.445)	(1.544)
ZSCORE_DUM	+	0.11775***	0.21593***	0.11646***	0.16883***
		(0.011)	(0.049)	(0.025)	(0.016)
STOCK_RET	+	0.01307	0.74017***	-0.23139***	-0.01292
		(0.011)	(0.049)	(0.025)	(0.015)
ROA	+	0.73823***	6.09296***	0.44654*	1.09016***
		(0.084)	(0.370)	(0.192)	(0.118)
LSIZE	+	0.20442***	0.45001***	0.64289***	0.48039***
		(0.005)	(0.021)	(0.011)	(0.007)
GROWTH_OPPORT	+	-0.01774***	-0.06322***	0.06163***	0.02497***
		(0.004)	(0.018)	(0.009)	(0.006)
CASH_SHORTFALL	+	0.15929***	1.13255***	-0.26108**	0.21315***
		(0.045)	(0.196)	(0.100)	(0.062)

Table 4.32 – Continued

OPERATING_LOSS	-	-0.03870*	0.03450	0.06453	-0.08351***
		(0.018)	(0.079)	(0.042)	(0.025)
TAX_RATE	0	0.07621***	-0.50104***	0.19303***	0.12079***
		(0.010)	(0.046)	(0.023)	(0.014)
DIV_CONST	+	0.03601***	0.05025	0.11261***	0.05715***
		(0.011)	(0.047)	(0.023)	(0.015)
INVEST_EXPENSE	+	-0.26393**	2.16457***	0.83687***	0.43760***
		(0.090)	(0.397)	(0.201)	(0.126)
LEVERAGE	-	0.04981	0.30697**	-0.53698***	-0.14015***
		(0.026)	(0.114)	(0.061)	(0.036)
FP_FACTOR	+	-0.26825	-5.32408***	-9.42997***	-4.71496***
		(0.192)	(0.845)	(0.429)	(0.268)
DIV_YIELD	-	0.00004	-0.01923***	-0.00697***	-0.00458***
		(0.001)	(0.003)	(0.001)	(0.001)
AGE	+	0.01060***	0.00096	-0.00641***	0.00248**
		(0.001)	(0.003)	(0.001)	(0.001)
DUALITY	+	0.04024*	0.81518***	-0.07065	0.11215***
		(0.016)	(0.071)	(0.037)	(0.022)
EXECDIR	+	0.45379***	0.16502**	0.92946***	0.78727***
		(0.013)	(0.056)	(0.030)	(0.018)
GENDER	-	0.10551***	-0.28812*	0.14002*	0.05082
		(0.032)	(0.141)	(0.071)	(0.045)
TURNOVER	?	-0.34313***	0.02313	0.00642	-0.21063***
		(0.015)	(0.065)	(0.035)	(0.020)
RATING_DUM	+	0.00695	0.07908	-0.01961	-0.00683
		(0.012)	(0.054)	(0.027)	(0.017)
PRESIDENT	+	0.19649***	-0.43364***	0.23508***	0.19595***
		(0.010)	(0.043)	(0.022)	(0.014)
CONSTANT		3.41525***	-1.10227***	0.53432***	2.24916***
		(0.056)	(0.246)	(0.129)	(0.078)
Observations		17215	17215	13043	17215
Adjusted R^2		0.35	0.10	0.40	0.44
Wald test of the coefficient of idiosyncratic risk in two regressions: Chi-squared and (p-value)		.77 (.38)	6.58*** (.010)	27.33*** (000)	5.47** (.020)

Table 4.32 presents the coefficients and standard errors obtained from OLS regressions of CEOs' compensation for firms with good and poor governance (Panel A and B, respectively). We find that *IDIO_RISK* has a positive impact on all components of CEOs' compensation in both groups. These results confirm our main hypothesis that *IDIO_RISK* has a positive influence on CEOs' compensation. However, our main interest is to find whether *IDIO_RISK* has a differential impact on CEOs' pay in firms with good and poor governance.

We use the Wald test to examine whether the coefficient on *IDIO_RISK* is statistically different across the two groups. The chi-squared test statistics (p-values) for salary, bonuses, equity and total compensation regressions are .77 (0.38), 6.58 (0.01), 27.33 (000) and 5.47 (0.02), respectively. These results suggest that *IDIO_RISK* has a differential impact on average CEOs' bonus, equity and total compensation in firms with good governance versus poor governance, supporting our H7.

Table 4.33 Differential Impact of Idiosyncratic Risk on CEO Compensation: OLS Regressions for Good and Poor Governance Firms

This table shows the pooled regression for CEOs' compensation and idiosyncratic volatility in good and poor governance firms. The table shows OLS regression results for CEOs' salary, bonuses, equity and total compensation. The sample contains 24,253 observations, and covers the period 1992 to 2009. All variables are defined in Appendix A. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Variables	Predicted	Log of Salary	Log of Bonus	Log of Equity	Log of Total Pay
IDIO_RISK	+	0.0778**	1.7137***	1.5736***	0.9809***
		(0.029)	(0.207)	(0.176)	(0.082)
GGOV_DUM	+	-0.0277**	0.1417***	-0.0919***	-0.0598***
		(0.010)	(0.038)	(0.020)	(0.013)
*GGOV_DUM*IVOL*	+/-	0.0718	-2.7254***	0.0772	-0.1547*
		(0.048)	(0.184)	(0.132)	(0.067)
SYS_RISK	+	0.2289	0.9463	27.3336***	12.9656***
		(1.560)	(5.292)	(3.270)	(2.401)
ZSCORE_DUM	+	0.1169***	0.1880***	0.1141***	0.1752***
		(0.012)	(0.041)	(0.024)	(0.016)
STOCK_RET	+	0.0090	0.7394***	-0.2143***	-0.0163
		(0.013)	(0.041)	(0.023)	(0.016)
ROA	+	0.8420***	5.9839***	0.2387	1.0830***
		(0.080)	(0.330)	(0.186)	(0.123)
LSIZE	+	0.1807***	0.4316***	0.5806***	0.4482***
		(0.007)	(0.019)	(0.011)	(0.008)
GROWTH_OPPORT	-	-0.0190***	-0.0684***	0.0763***	0.0246**
		(0.005)	(0.014)	(0.014)	(0.008)
CASH_SHORTFALL	+	0.1773***	1.1095***	-0.3221***	0.1706**
		(0.052)	(0.162)	(0.087)	(0.059)
OPERATING_LOSS	+	-0.0801**	0.0471	0.1203**	-0.0570
		(0.027)	(0.068)	(0.041)	(0.031)
TAX_RATE	-	0.0668***	-0.3786***	0.2214***	0.1224***
		(0.010)	(0.041)	(0.019)	(0.013)
DIV_CONST	0	0.0191*	0.0054	0.1447***	0.0636***
		(0.010)	(0.040)	(0.022)	(0.013)
INVEST_EXPENSE	+	-0.2808**	1.8062***	0.8611***	0.3930***
		(0.090)	(0.350)	(0.188)	(0.116)
LEVERAGE	+	0.1282***	0.2101*	-0.4790***	-0.0642
		(0.027)	(0.106)	(0.056)	(0.037)

Table 4.33 – Continued

FP_FACTOR	-	-0.1913	-4.4454***	-9.6583***	-4.7116***
		(0.209)	(0.729)	(0.462)	(0.281)
DIV_YIELD	+	0.0004	-0.0054*	-0.0035***	-0.0016***
		(0.000)	(0.002)	(0.001)	(0.000)
AGE	-	0.0114***	-0.0026	-0.0052***	0.0030***
		(0.001)	(0.002)	(0.001)	(0.001)
DUALITY	+	0.0843***	0.7236***	-0.1051***	0.1299***
		(0.024)	(0.063)	(0.031)	(0.029)
EXECDIR	+	0.4478***	0.2308***	0.9387***	0.7939***
		(0.012)	(0.043)	(0.026)	(0.017)
GENDER	+	0.0826***	-0.3721**	0.1372*	0.0452
		(0.023)	(0.128)	(0.065)	(0.040)
TURNOVER	-	-0.3515***	-0.0711	-0.0069	-0.2219***
		(0.016)	(0.051)	(0.037)	(0.022)
RATING_DUM	?	0.0338*	0.1316**	0.0371	0.0423*
		(0.015)	(0.045)	(0.025)	(0.018)
PRESIDENT	+	0.1846***	-0.3037***	0.2855***	0.2114***
		(0.009)	(0.039)	(0.022)	(0.013)
CONSTANT	+	3.4766***	-0.6922**	0.9968***	2.3829***
		(0.057)	(0.221)	(0.142)	(0.078)
Observations		24253	24253	18282	24253
Adjusted R^2		0.29	0.11	0.40	0.42

In Table 4.33, we present OLS regression results of CEOs' compensation. In this estimation we include interaction of *GOV_DUM* and *IDIO_RISK* to test whether *IDIO_RISK* has a differential impact on CEOs' pay in the two groups of our sample. A negative and statistically significant coefficient of the interaction variable in CEOs' bonus and total compensation regressions confirms our findings in Table 4.32. However, regression results do not show a statistically different impact of *IDIO_RISK* on CEOs' salary and equity compensation in the two groups of our sample. Overall, our test results support our hypothesis that *IDIO_RISK* has a differential impact on CEOs' compensation between firms with good and poor governance.

CHAPTER 5

CONCLUSION

This chapter offers conclusions of the research findings reported in Chapter 4. The results reported in the previous chapters suggest a meaningful relationship between executive compensation and idiosyncratic risk. The main findings of this research will fill a void in compensation management research.

5.1 Summary of Research

This dissertation seeks to answer the following seven broad research questions established in Chapter 1:

a) Does idiosyncratic risk influence executive compensation; and, if it has an influence, does idiosyncratic risk affect executive pay positively or negatively?

b) Does idiosyncratic risk affect executive compensation differently in regulated and non-regulated firms?

c) Does idiosyncratic risk affect executive compensation differently in new and old economy firms?

d) Is there a differential impact of idiosyncratic risk on executive compensation between high-technology and non-technology firms?

e) Is there a differential impact of idiosyncratic risk on executive compensation between investment grade and speculative firms?

f) Does idiosyncratic risk affect executive pay differentially in firms with good governance and poor governance?

g) Does idiosyncratic risk affect executive compensation differentially during recession and normal business cycles?

5.1.1 Executive Compensation and Idiosyncratic Risk

The first research question deals with the general relationship between executive compensation and idiosyncratic risk. Executive compensation in this study refers to salary, bonuses, equity and total compensation. We present our research findings separately for each component of executive compensation. Moreover, we analyze the effect of idiosyncratic risk separately for all top executives, CEOs and non-CEO executives.

We use four different regression models to analyze the effect of idiosyncratic volatility on executive compensation. First, we use an ordinary least squares (OLS) regression model without controlling industry and year effect. Idiosyncratic risk has positive and highly significant coefficients for all components of executive compensation. These results support our main hypothesis that there is a positive relationship between executive pay and idiosyncratic volatility.

We further test the effect of idiosyncratic volatility on executive pay controlling for industry and year effect using the OLS regression model. When we control for industry and year effect, we find that idiosyncratic risk is positively related to executive salary, equity and total compensation. However, we do not find a statistically significant relationship between idiosyncratic risk and executive bonuses.

Following prior research on executive compensation, we explore the relationship between executive compensation and idiosyncratic risk. We use robust regression and median regression models to examine the effect of idiosyncratic risk on executive salary, bonuses, equity and total compensation. Again, we find a positive and statistically significant relationship between executive compensation and idiosyncratic risk supporting our H1. More specifically, we find a positive impact of idiosyncratic volatility on executive salary, bonuses, equity and total compensation.

We also analyze the effect of idiosyncratic risk on CEOs' compensation. First, we use an OLS regression model without controlling for industry and year effect. The test results show that idiosyncratic risk is positively correlated with CEOs' salary, bonuses, equity and total compensation. These relationships are statistically significant. We further test the effect of idiosyncratic risk on CEOs' pay after controlling for industry and year effect. When we control for industry and year effect using the OLS regression model, we find that idiosyncratic volatility is not related to CEOs' salary and bonus compensation. Even after controlling for industry and year effect, idiosyncratic volatility has a positive and statistically significant effect on CEOs' equity and total compensation.

We further test the effect of idiosyncratic risk on CEOs' compensation using a robust regression model. In this regression we include both industry and year effect. We find that idiosyncratic volatility has a positive effect on all components of CEOs' compensation. CEOs' salary, bonuses, equity and total compensation are positively correlated with idiosyncratic risk. When we use a median regression model, we find a positive and statistically significant relationship between all components of CEOs' compensation and idiosyncratic volatility. These findings support our H1 again.

5.1.2 Differential Effect of Idiosyncratic Risk on CEO Compensation

We also examine the effect of idiosyncratic risk on non-CEOs' executive salary, bonuses, equity and total compensation. We use OLS regression, OLS regression with industry and year effect control, robust regression and median regression to analyze the effect of idiosyncratic risk on non-CEOs' executive compensation. Except for the bonus compensation in our OLS regression model controlling for industry and year effect, we find that idiosyncratic risk has a positive and statistically significant impact on non-CEOs' executive salary, bonuses, equity and total compensation. Again, these findings support our main hypothesis.

Our test results show that idiosyncratic risk has a positive effect on all components of executive compensation. In other words, idiosyncratic risk is positively related to executive salary, bonuses, equity and total compensation. Test results also show similar results for CEOs' compensation. Idiosyncratic risk is positively related to CEOs' salary, bonuses, equity and total compensation. Furthermore, our test results also find that idiosyncratic risk has a positive impact on non-CEOs' salary, bonuses, equity and total compensation. Thus, our research findings support hypothesis H1. These results are consistent with the findings of Eaton and Rosen (1983), Demsetz and Lehn (1985), Lewellen, Loderer, and Martin (1987), Guay (1997), Guay (1999) Core and Guay (1999), and Prendergast (2000, 2002). The main findings of this dissertation do not support the findings of Lambert and Larcker (1987), Aggarwal and Samwick (1999), Mishra, McConaughy and Gobeli (2000), Jin (2002), and Garvey and Milbourn (2003).

The second hypothesis in this dissertation addresses the differential impact of idiosyncratic risk on CEOs' compensation. Hypothesis H2 postulated that the effect of idiosyncratic risk on CEOs' compensation in regulated and non-regulated firms is different. We use two different approaches to test the differential impact of idiosyncratic risk on CEOs' compensation in two sample groups. Test results find partial support that idiosyncratic risk has a differential impact on CEOs' salary, bonuses, equity and total compensation in regulated and non-regulated firms. We first run regression models separately in regulated and non-regulated firms. Then we compare estimated coefficients of idiosyncratic volatility using the Wald test. The test results show that idiosyncratic risk has a differential impact on CEOs' salary and bonus compensation in regulated and non-regulated firms. However, we fail to document a differential impact of idiosyncratic risk on equity and total compensation.

We further test whether or not idiosyncratic risk has a differential impact on different components of CEOs' pay using *REG_DUM*IDIO_RISK.* Test results indicate that idiosyncratic risk has a differential impact on CEOs' bonuses, equity and total compensation. These results partially support our second hypothesis.

The third hypothesis (H3) postulates that there is a differential impact of idiosyncratic risk on CEOs' compensation in new and old economy firms. Our Wald test results show that idiosyncratic risk has a differential impact on CEOs' bonuses and total compensation in new and old economy firms. However, test results do not find a differential impact of idiosyncratic risk on CEOs' salary and equity compensation. We further test this relationship using *NEW_DUM*IVOL.* Our test results show that idiosyncratic volatility has a differential impact on CEOs' salary, equity and total compensation and no differential impact on CEOs' bonus pay among the two groups in the sample. Thus, we find partial support of our third hypothesis that there is a differential impact of idiosyncratic risk on CEOs' compensation.

The fourth hypothesis (H4) postulates that there is a differential impact of idiosyncratic risk on CEOs' compensation in high-technology and non-technology firms. Wald test results show that idiosyncratic risk has a differential impact on CEOs' bonuses and total compensation among high-tech and non-technology firms. However, test results do not show a differential impact of idiosyncratic risk on CEOs' salary and equity compensation.

We further test this relationship using *HTECH_DUM*IVOL.* Our test results show that idiosyncratic volatility has a differential impact on CEOs' salary, bonuses and total compensation and no differential impact on CEOs' equity pay among the two groups in the sample. *Thus, we find partial support to our fourth hypothesis that there is a differential impact of idiosyncratic risk on CEOs' compensation.

The fifth hypothesis (H5) postulates that there is a differential impact of idiosyncratic risk on CEOs' compensation among investment grade and speculative firms. Wald test results show that idiosyncratic risk has a differential impact on CEOs' bonuses, equity and total compensation but no differential impact on CEOs' salary among investment grade and speculative firms. We further test this relationship using *INVEST_DUM*IVOL.* Our test results show that idiosyncratic volatility has a differential impact on CEOs' equity and total compensation and no differential impact on CEOs' salary and bonus compensation among the two groups in the sample. Thus, we find partial support to our fifth hypothesis that there is a differential impact of idiosyncratic risk on CEOs' compensation among investment grade and speculative firms.

We hypothesize that there is a differential impact of idiosyncratic risk on CEOs' compensation during recession and normal business cycles. Wald test results show that idiosyncratic risk has a differential impact on CEOs' salary, equity and total compensation but no differential impact on CEOs' bonuses during both a recession and a normal business cycle.

We further test this relationship using *REC_DUM*IVOL.* Our test results show that idiosyncratic volatility has a differential impact on CEOs' salary, bonuses, equity and total compensation among the two groups in the sample. These results indicate that idiosyncratic risk has a differential impact on all components of CEOs' pay. These results support our sixth hypothesis that there is a differential impact of idiosyncratic risk on CEOs' compensation during both a recession and a normal business cycle.

We hypothesize that there is a differential impact of idiosyncratic risk on CEOs' compensation in firms with good or poor governance. Wald test results show that idiosyncratic risk has a differential impact on CEOs' bonuses, equity and total compensation but no differential impact on CEOs' salary among firms with good or poor governance.

We further test this relationship using *GOV_DUM*IVOL.* Our test results show that idiosyncratic volatility has a differential impact on CEOs' bonuses and total compensation and no differential impact on CEOs' salary and equity compensation among the two groups in the sample. Thus, these results show partial support of the last hypothesis that there is a differential impact of idiosyncratic risk on CEOs' compensation among good and poor governance firms.

5.2 Conclusion

The results of this dissertation suggest that idiosyncratic risk is an important element of executives' compensation. It is positively related to executive salary, bonuses, equity and total compensation. The results remain consistent when we test the relationship between idiosyncratic volatility and CEOs' and non-CEOs' compensation separately. Therefore, we conclude that there is a positive relationship between executive compensation and idiosyncratic volatility. These findings support our main hypothesis. We also hypothesize that idiosyncratic risk has a differential impact on CEOs' compensation among the different groups in our samples. We find results supporting our hypothesis in most of the cases.

APPENDIX

VARIABLE NAME, DEFINITION AND DATA SOURCE

Variables	Data Definition and Source
Log of SALARY	Logarithmic transformation of the dollar value of the base salary earned by the named executive officer during the fiscal year. Data source: Standard and Poor's ExecuComp database.
Log of BONUS	Logarithmic transformation of the dollar value of a bonus earned by the named executive officer during the fiscal year. Data source: Standard and Poor's ExecuComp database.
Log of EQUITY_COMP	Logarithmic transformation of sum of Black Scholes value option awards, fair value of option awards, restricted stock grant and fair value of stock awards. Data source: Standard and Poor's ExecuComp database.
Log of TOTAL_COMP	Logarithmic transformation of sum of salary, bonus, non-equity incentive plan compensation, grant-date fair value of option awards, grant-date fair value of stock awards, deferred compensation earnings reported as compensation, and other compensation. Data source: Standard and Poor's ExecuComp database.
IDIO_RISK	Annualized residual standard deviation derived from EGARCH on Fama-French three factor model regression using up to 60 monthly observations immediately before the current fiscal year starting month. Data source: CRSP monthly stock returns
SYS_RISK	Systematic risk is the beta-squared multiplied by the variance of market return. It is measure is derived from the Fama French three factor model regression using up to 60 monthly observations immediately before the current fiscal year ending month. Data source: CRSP monthly returns
ZSCORE_DUM	Equals one if Altman's *Z*-score is greater than 1.81, and zero otherwise. Altman's *Z*-score is computed as sum of 3.3 ∗ OIADP/AT, 1.2 *(ACT-LCT)/AT, Sale/AT, 0.6*PRCC_F*CSHO/sum (of DLTT DLC), and 1.4*RE/AT. Data source: COMPUSTAT Annual Industrial file.
STOCK_RET	Buy-and-hold return during the fiscal year. Data source: CRSP monthly file.
ROA	Ratio of operating income before depreciation to total assets. Data source: COMPUSTAT Annual Industrial file.
LSIZE	Natural logarithm of total assets. Data source: COMPUSTAT Annual Industrial file.
SIZE2	Squared of total assets. Data source: COMPUSTAT Annual Industrial file.
GROWTH_OPPORT	Growth opportunity is book value of assets scaled by the market value of assets. Data source: COMPUSTAT Annual Industrial file.
CASH_SHORTFALL	Cash flow shortfall is defined as sum of three year average of common and preferred dividends and cash flow from investing minus cash flow from operations scaled by total assets. Data source: COMPUSTAT Annual Industrial file.
OPERATING_LOSS	Net operating loss equals to 1 if the firm has net operating loss carry forwards in any of the three years prior to when the new equity grant is awarded. Data source: COMPUSTAT Annual Industrial file.
TAX_RATE	Marginal tax rates is a dummy variable set equal to one when firms have nonzero tax loss carry-forwards and zero otherwise. Data source: COMPUSTAT Annual Industrial file.
DIV_CONST	Dividend constraint equal to 1 if the sum of retained earnings at year-end, cash dividend and stock repurchase during the year scaled by the prior year's cash dividends and stock repurchases is less than two
ADV_EXPENSE	Advertising expenditure (xad or zero if missing) scaled by assets. Data

	source: COMPUSTAT Annual Industrial file.
R&D_EXPENSE	Research and development expenditures (xrd or zero if missing) scaled by assets. Data source: COMPUSTAT Annual Industrial file.
INVEST_EXPENSE	Investment expenditure is the sum of capital expenditures plus acquisitions over the last three years divided by market value of assets. Data source: COMPUSTAT Annual Industrial file.
LEVERAGE	Leverage is calculated as the difference between book value of assets and book value of equity scaled by market value of equity. Data source: COMPUSTAT Annual Industrial file.
FP_FACTOR	Firm policy factor score is obtained using common factor analysis on the variables book-to-market ratio, R&D expenditures, and Investment expenditures. Data source: COMPUSTAT Annual Industrial file.
DIV_YIELD	Dividend yield is dividend per share divided by close price of firm stock for the fiscal year. Data source: COMPUSTAT Annual Industrial file.
AGE	Executive's Age. Data source: Standard and Poor's ExecuComp database.
AGE2	Squared of executive's Age. Data source: Standard and Poor's ExecuComp database.
DUALITY	Duality equals one if the firm's executive holds more than one position during the fiscal year and zero otherwise. Data source: Standard and Poor's ExecuComp database.
EXECDIR	Equals one if the firm's executive served as a director during the fiscal year and zero otherwise. Data source: Standard and Poor's ExecuComp database.
GENDER	Equals to one if an executive is female and zero otherwise. Data source: Standard and Poor's ExecuComp database.
TURNOVER	Executive turnover equals 1 if an executive during the fiscal year is different from the last fiscal year and zero otherwise. Data source: Standard and Poor's ExecuComp database.
RATING_DUM	Equals to one if a firm has a bond rating during the fiscal year and zero otherwise. Data source: Standard and Poor's Credit Rating database.
REG_DUM	Equals one if the firm's SIC code is between 4,900 and 4,939 and zero otherwise. Data source: COMPUSTAT Annual Industrial file.
*REG_DUM*IVOL*	Interaction variable computed as REG_DUM multiplied by IDIO_RISK.
INVEST_DUM	Investment grade firm equal one if a firm has S&P domestic long term issuer credit rating during the fiscal year equals BBB or above and zero otherwise. Data source: Standard and Poor's Credit Rating database.
*INVEST_DUM*IVOL*	An interaction variable computed as INVEST_DUM multiplied by IDIO_RISK.
NEW_DUM	Equals to one if firm belongs to new economy firms and zero otherwise. Data source: COMPUSTAT Annual Industrial file.
*NEW_DUM*IVOL*	An interaction variable computed as NEW_DUM multiplied by IDIO_RISK.
HTECH_DUM	Equals to one if a firm belongs to high technology industry group and zero otherwise. Data source: COMPUSTAT Annual Industrial file.
*HTECH_DUM*IVOL*	An interaction variable computed as HTECH_DUM multiplied by IDIO_RISK.
REC_DUM	Equals to one if a firm belongs to recession period and zero otherwise. Data source: COMPUSTAT Annual Industrial file.
*REC_DUM*IVOL*	An interaction variable computed as REC_DUM multiplied by IDIO_RISK.

EINDEX	EINDEX constructed by Bebchuk, Fried, and Walker (2009) as a proxy for corporate governance. The highest value of EINCEX is 6. Data source: Professor Bebchuk's Website.
GGOV_DUM	Equals to one if a firm has EINDEX value less than average EINDEX value (2.62) in the sample and zero otherwise. Data source:
*GGOV*IVOL*	An interaction variable computed as GGOV_DUM multiplied by IDIO_RISK.

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