THREE ESSAYS IN

EXECUTIVE

COMPENSATION

by

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ABSTRACT

In essay one, we examine overconfident CEO-directors and find they attend more board meetings, are more active in nominating committees, and have more independent directorships. Attendance is higher when multiple overconfident directors are present on the board. When an overconfident board selects a new CEO after a CEO turnover, they are more likely to appoint a better prepared and more reputable CEO. Overconfident boards are also more likely to select an overconfident CEO. We also find overconfident boards exacerbate the restrained use of debt when an overconfident CEO is present, and we find evidence that the association between CEO-directors and greater CEO pay is driven solely by overconfident CEO-directors on the board. This evidence indicates overconfident CEO-directors exhibit significant influence on the board and over the firm's CEO.

In essay two, I analyze the CEO incentives of inside debt in the form of deferred equity compensation in the context of M&A decisions. CEO inside debt holdings are negatively associated with the likelihood of the firm engaging in an M&A. When firms with higher levels of CEO inside debt decide to engage in an acquisition, those acquisitions are non-diversifying, relatively smaller deals, and are paid using a greater portion of stock. The evidence indicates that inside debt incentivizes CEOs to make less risky decisions for the benefit of debt holders and at the expense of shareholders.

In essay three, I analyze both CEO inside debt and firm debt jointly to further investigate compensation incentives of risky decision-making and the resulting financial policy decisions concerning the debt structure of the firm. I find larger firms with high CEO inside debt tend to

diversify, as calculated by the Herfindahl-Hirschman index of debt type usage. These types of firms use a higher percentage of term loans and other debt but a lower percentage of drawn credit lines and commercial loans. Larger firms with high CEO inside debt have lower interest rates on these debt instruments and shorter maturities, suggesting a more conservative financing policy with regards to debt.

LIST OF ABBREVIATIONS, ACRONYMS, AND SYMBOLS

=	Equal to
>	Greater than
<	Less than
CEO	Chief Executive Officer
M&A	Mergers and Acquisitions
P-value	Chance an effect exists
R^2	R-squared
SEC	Securities and Exchange Commission
T-stat	T-statistic from the Student's t-distribution
Z-stat	Z-statistic from the Normal distribution

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CHAPTER 1

INTRODUCTION

This dissertation provides three essays in the executive compensation space. The first essay relates director and board behavior with overconfidence, measured by the timing, exercise, and purchase of options and stock, respectively. The second essay provides a link between long-term incentive pay (deferred equity compensation) and the investment decision of a merger and acquisition. The third essay discusses debt financing policy and the CEO's inside debt, defined as the total deferred compensation from bonus pay and future retirement payments from pension plans.

The first paper discusses CEO-director overconfidence. CEOs tend to be overconfident about their abilities in their main role. Does their overconfident behavior also influence their actions outside their own firm? As directors they provide monitoring and advisory services for shareholders of other public firms. In this paper we examine independent directors who are also CEOs (CEO-directors) and specifically compare those CEO-directors who are overconfident with those who are not (diffident).

The second paper shows a relationship between long-term incentive pay and mergers and acquisitions. Long-term incentive payouts (LTIP) encompass 60% or more of a median S&P 500 CEO's compensation package. These conditional company shares are distributed in two parts. The CEO receives half of the shares immediately, followed by the remainder three years later. The CEO receives this portion only if he remains with the company, and the company continues to exist. One of the main differences between deferred equity compensation and pension plans is

what occurs in the event of bankruptcy. The CEO receives a percentage of his pension upon company bankruptcy, but the deferred equity compensation value becomes zero since the remaining portion of shares becomes worthless.

The third paper relates inside debt and debt financial policy. Structures of the firm and how they translate to the real world have been of interest to academicians and regulators for years. I exploit a new database, Capital IQ, to breakdown the components of total debt, into commercial paper, drawn credit lines, senior and subordinated bonds and notes, term loans, and capital leases. Another structure crucial to understanding firm decisions involves executive compensation. Specifically, inside debt is of particular interest since the SEC mandated disclosure of this type of compensation since 2006. Inside debt is the total pension value from defined benefit retirement plans and deferred compensation from bonus payouts. For example, a CEO may receive a $500,000 bonus, but she will not receive it immediately. She may receive it over 5 years, yielding $100,000 a year. However, if she is fired before the five years is over, she will lose any compensation due to her, similar to a bondholder whose firm has gone bankrupt.

The remainder of this dissertation is broken down by essay. Chapter 2 examines director overconfidence. Chapter 3 discusses CEO long-term incentive pay in mergers and acquisitions. Chapter 4 analyzes CEO inside debt and firm debt. Chapter 5 concludes.

CHAPTER TWO

DIRECTOR OVERCONFIDENCE

2.1. Introduction

Independent directors who are also the CEO of another firm, CEO-directors, are important monitoring and advisory components of many public boards. Hallock (1997) finds interlocked CEOs receive higher pay and lead larger firms. Fahlenbrach, Minton, and Pan (2011) find firms with directors who are former CEOs have higher ROA. However, there can be important differences among CEOs, which can impact their performance as directors. Recent research reveals a difference in CEO overconfidence[1] is associated with significant differences in an executive's decision making as a CEO (e.g. investment decisions, (Malmendier and Tate (2005)); equity issuance, (Malmendier, Tate, and Yan (2008)); and innovation (Hirshleifer and Teoh (2012)). Because directors are appointed for their decision management skills (Fama and Jensen (1983)) differences in overconfidence, which affects decision-making, can also be associated with important differences in CEO-directors that can be vital to shareholders. In this paper, we examine overconfident CEO-directors relative to other independent CEO-directors.

We start by identifying all independent CEO-directors in the Risk Metrics director database for the years 1996 to 2011. Then we identify those CEO-directors who are overconfident following Malmendier and Tate (2005)[2] and define a board as being overconfident if at least one independent

[1] We follow Malmendier and Tate (2005) in defining confidence versus optimism. Confidence refers to one's own abilities and personal outcomes. Optimism refers to outcomes beyond one's control. Overestimation of these outcomes leads to overconfidence and overoptimism, respectively.

[2] A CEO is considered overconfident is at least one of the following three indicator variables is true: Holder67, where the CEO holds an option with a moneyness of 67% or more after 5 years; Longholder, where the CEO holds an option with a moneyness of 40% or more in its final year of expiration; or Net Buyer, where the CEO holds more company stock than he did five years prior. We use this measure of overconfidence since it is not correlated with CEO market timing. According to Malmendier and Tate (2005), less than half of overconfident CEOs beat the market by waiting

director is an overconfident CEO-director. At the director level we find evidence that overconfident CEO-directors miss fewer meetings than other directors and exhibit a significantly greater likelihood of serving on the nominating committee relative to other CEO-directors. This is consistent with their overconfidence driving these directors to be more involved wherever they serve. In addition, we find evidence that overconfident directors can have a positive influence on other board members. Specifically, we find attendance is higher when multiple overconfident directors are present on the board. Relatedly, we also find strong evidence of a greater demand for these director's services, as they serve on significantly more boards than other CEO-directors.

Next, we examine an important board level decision, CEO-selection[3], and find overconfident boards are more likely to select better known and more reputable CEOs. We find overconfident CEO-directors are more likely to hire an insider, someone with prior experience as a CEO or someone holding a directorship. In each case, there is more easily accessible information on the new CEO making the hire less risky.

We also find overconfident boards are more likely to select an overconfident CEO. Given the recent literature on overconfident CEOs, we examine whether overconfident boards complement or substitute for overconfident CEOs. Malmendier et al. (2011) find overconfident CEOs use less external financing relative to their peers. After controlling for a CEO's overconfidence, the board's overconfidence, and the interaction between the two, we find overconfident boards decrease external financing when an overconfident CEO is in power. Thus,

to exercise. The overconfident CEOs would have been better off exercising their options and investing the proceeds in the S&P500.

[3] See Mace (1971), Vancil (1987), Warner, Watts and Wruck (1988), Weisbach (1988), Yermack (1996), Denis, Denis and Sarin (1997), Parrino (1997), Hermalin and Weisbach (2000), Huson, Parrino and Starks (2001), Dayha, McConnell and Travlos (2002), Fee and Hadlock (2003), Huson, Malatesta and Parrino (2004), Adams, Hermalin and Weisbach (2008), Mobbs (2012), and Mobbs and Raheja (2012).

overconfident boards with overconfident CEOs provide a complementary effect that can exacerbate one potentially adverse effect of CEO overconfidence.

Finally, we extend early findings on CEO-directors and examine the association with CEO-directors (Hallock (1997)) and firm CEO salary levels. Fahlenbrach et al. (2010) find CEOs receive a higher salary if a CEO from another firm is on her company's board. After distinguishing CEO-directors based on their overconfidence, we find this effect primarily comes from overconfident CEO-directors.

Endogeneity is mitigated since overconfidence is a trait, which may not be known by the board at the time of the director's nomination. In fact, Malmendier and Tate (2005) state overconfidence is "harder to identify ex ante." However, in our case, the overconfidence trait is possibly revealed in the director's actions where they serve as a CEO. The board nominating them as a director therefore, may have observed the revelation of the overconfidence trait. Due to this possibility, we take additional steps to address this possible endogeneity. Specifically, we use propensity-score matching to test differences in similar firms whose main difference is the presence of the overconfident CEO-director. This approach allows us to compare firms with an overconfident director to firms that are similar in multiple dimensions except they do not have an overconfident director.

In summary, our findings suggest overconfidence is associated with greater board activity and diligence in CEO selections, both of which suggest overconfident CEO-directors can be valuable board members. Our findings shed new light on the recent literature on executive overconfidence and reveal one avenue in which overconfidence is valuable. This is important since the prior literature is mixed as to whether overconfident CEOs are beneficial or detrimental to their firms. For example, positive aspects of overconfidence include being more responsive to cash flow

(Malmendier and Tate (2005)), generating a potential higher return to shareholders (Goel and Thakor (2008)), and exploiting innovation through research and development (Hirshleifer et al. (2012)). Negative effects of overconfidence involve investment distortion (Malmendier and Tate (2005), Goel and Thakor (2008)), engagement in value-destroying mergers and acquisitions (Malmendier and Tate (2008)), contracts with high risk compensation incentives (Gervais et al. (2011)), and suboptimal external financing (Malmendier and Tate (2011)).

These new insights also make several contributions to the corporate governance literature. Prior studies, starting with the ground-breaking work of Malmendier and Tate (2005, 2008), have gone in-depth with the agency conflicts of overconfidence and its effect on CEO behavior with the firm. However, no empirical study has analyzed overconfident CEO-directors and their actions on boards. Recent theoretical and empirical work has examined a board's relation with an overconfident CEO. Goel and Thakor (2005) provide a theoretical model showing boards fire excessively diffident or overconfident CEOs. Goel and Thakor (2008) theoretically show CEOs should be fired if they are extremely diffident or overconfident. Campbell et al. (2011) theoretically show and find boards fire CEOs with extremely low or high optimism. Sironi and Suntheim (2012) find active boards reduce bank firm risk during the financial crisis if their CEO was classified as overconfident.

We also contribute to the literature on CEO-directors by finding significant differences in CEO-directors based on whether or not they are overconfident. Hallock (1997) finds CEO-directors manage larger firms and receive larger pay for directorship participation. Other studies find firm value is enhanced with the addition of a CEO-director (Fahlenbrach et al. 2011) and is diminished upon death or retirement (Nguyen and Nielsen (2010), Fracassi and Tate (2012)). Our

finding that overconfident CEO-directors are more active and in more demand than other CEO-directors highlights new and important differences among CEO-directors.

Our findings also contribute to the recent literature that examines individual director characteristics beyond their classification as independent. Recent literature has discovered important differences among inside directors (Masulis and Mobbs (2011) and Mobbs (2013)) and independent directors based on reputation (Masulis and Mobbs (2014a,b), busyness (Fich and Shivdasani (2006)), financial expertise (DeFond, Hann, and Hu (2005)), and social ties to the CEO (Hwang and Kim (2009)).

Finally, these findings contribute to the large psychology literature concerning overconfidence[4] by examining how individual overconfident directors act (Alicke (1995), Svenson (1981), and Weinstein (1980)) and how they contribute to group decision making by the board of directors. Our finding of higher board attendance among overconfident CEO-directors is consistent with the psychology research which finds overconfident individuals like to be in control (Alicke (1985)). In addition, our finding of overconfident CEO-directors making safer CEO decisions is consistent with their being more risk-averse than anticipated (Moore (1977)), especially when the outcome is out of their hands as is the case with the performance of a newly selected CEO. Relatedly, our finding of overconfident boards preferring safer CEO choices is consistent with Russo and Schoemaker (1992), who find groups of overconfident individuals make better decisions than an overconfident individual.

Our findings contribute to the growing literature in executive overconfidence. Using a tournament approach, Banerjee et al. (2014) find overconfident executives are more likely to be

[4] The psychology literature measures overconfidence as extreme outliers from results of surveys about ratings, questions, and decisions in experimental settings. In the finance literature, we are able to identify overconfidence based on actual decisions about stock and option purchases and exercises, respectively.

promoted internally when the hiring company is large and less risky as measured by the standard deviation of stock returns. They also find that newly selected overconfident CEOs improve performance after their appointments. Using our director sample, we find overconfident boards are more likely to select a new CEO who is overconfident. Our results complement their finding by showing the board's composition affects the likelihood that an overconfident executive is selected.

The remainder of the paper is organized as follows: In Section 2.2, we review the relevant literature and develop the main testable hypotheses. We follow with a description of the sample data and methodology employed in the analysis in Section 2.3. Section 2.4 presents and discusses the results of our main empirical tests on the independent CEO-directors and boards. We conduct a series of robustness checks in Section 2.5. Section 2.6 demonstrates how CEO-director overconfidence affects prior results in the literature. Section 2.7 concludes.

2.2. Related Literature and Hypothesis

In addition to decisions within their own firm, many CEOs also serve as independent directors in other firms (e.g. Hallock (1997), Fracassi and Tate (2012) and Fahlenbrach et al. (2011)). While their responsibilities as a director are different from those as a CEO, their personality traits, such as overconfidence, carry over and can influence their behavior as a director.

Malmendier and Tate (2005) find overconfident CEOs exhibit distinctly different behavior relative to other CEOs. For example, they find overconfident CEOs overinvest when retained earnings are high and underinvest when external financing is necessary. Since their pioneering work, additional research finds overconfident CEOs issue relatively less equity (Malmendier and Tate 2011) and make value-destroying acquisitions (Malmendier and Tate 2008). Goel and Thakor (2008) predict overconfident CEOs invest less in producing information, and excessively

overconfident managers overinvest in projects which lead to lower firm value. Other research documents positive aspects of overconfident CEOs, which find they exploit growth opportunities, achieve higher innovation (Hirshleifer, Low, and Teoh (2012)), exhibit more conservative financing polices (Banerjee, Humphery-Jenner, and Nanda (2013)) and are less likely to engage in large accounting changes when coming in as a new CEO (Burg, Pierk, and Scheinart (2013)). As expected, excessive confidence in one's own ability leads CEOs to make significantly different decisions.

Prior research in the field of psychology reveals overconfidence is associated with an individual's belief they are better than the average person (e.g. Svenson (1981)) and have a greater sense of and need for being in control (e.g. Weinstein (1980)). CEOs naturally have control in their firm, by the nature of their title and their role as the voice of the company; however, as a director they are a member of team of other directors. To the degree overconfidence is a personality trait of the individual executive and not just a characteristic of the CEO position, we expect overconfident CEO-directors to exhibit different actions compared to other directors, especially other non-overconfident CEO-directors. Specifically, their desire for greater control can drive them to take a more active role in board meetings. Sniezek and Zarnoth (1997) find individuals with more confidence are indeed more active decision makers in a group. Adams and Ferreira (2009) and Masulis and Mobbs (2014a) show board meeting attendance and committee membership are associated with a director's level of effort and activity in a given directorship. Our first set of hypotheses concerning effort follow:

Hypothesis 1: Overconfident directors are more active in board meetings.

Hypothesis 1a: Overconfident directors miss fewer board meetings.

Hypothesis 1b: Overconfident directors are more likely to be involved in the most active committees, such as the audit or nominating committee.

To the degree overconfidence leads to a greater exertion of director effort and activity their services are likely to be in greater demand by other boards as shareholders desire more active directors. Moreover, overconfident directors can facilitate better board functionality. According to Barney and Busenitz (1997), "Overconfidence may be particularly beneficial in implementing a specific decision and persuading others to be enthusiastic about it as well." Finally, by serving with other directors in a group setting, the negative aspects associated with overconfidence are mitigated (e.g. Moore (1997), Sniezek (1992), Weinstein (1980), Miller and Ross (1975) and Russo and Schoemaker (1992)). As a result, the greater demand for their director services will result in overconfident directors holding more outside directorships relative to other CEO-directors, which leads to our next hypothesis.

Hypothesis 2: Overconfident directors are in greater demand for board seat positions.

CEO selection is arguably the most important decision boards have to make (e.g. Shleifer and Vishny (1997)). A director's overconfidence can influence his actions during the CEO selection, which has important implications for shareholders since shareholders experience negative consequences if directors make poor decisions based on irrational assessments of their own abilities (e.g. Larwood and Whittaker (1977) and Moore (1977)). Because the literature on overconfident CEOs clearly reveals significantly different decision making compared to non-overconfident CEOs (e.g. Malmendier and Tate (2005), Goel and Thakor (2008), Hirschleifer et al. (2012)), it follows that overconfident directors likely make significantly different decisions compared to other directors. Moreover, because overconfident people make the decision for a

group; overconfident directors, in turn, will have greater influence on the board (Sniezek and Zarnoth (1997)), which makes them an even more important director on the board.

We know from the psychology literature that overconfident individuals have more certainty about their decisions and thus expect their actions to produce success (Miller and Ross (1975)) and that overconfident managers quickly implement decisions, despite their reluctance to incorporate new information (Barney and Busenitz (1997)). However, group decisions are less overconfident than individual decisions (Russo and Schoemaker (1992)), thus serving on the board of directors, rather than serving as the sole decision maker, can mitigate the likelihood of poor choices arising from a CEO's overconfidence. This idea aligns with the theoretical prediction from Goel and Thakor (2008), who note overconfident CEOs invest less in gathering information. Together, this prior research on overconfident decision making in a group setting implies boards with an overconfident director are more inclined to make safer CEO choices that require less effort to uncover additional information, such as insiders, same industry, etc. These decisions require less information since these candidates are well-known relative to outsiders, or those from a different industry, etc. Generally speaking, directors have greater confidence in overconfident CEOs (Goel and Thakor (2005)), and they tend to promote overconfident executives more often (Banerjee et al. (2014)). We expect overconfident directors to be even more inclined to support executives who are overconfident like themselves (Sniezek and Zarnoth (1997)). Thus, our final set of hypotheses about decision-making follows, where an overconfident board has at least one overconfident CEO-director.

Hypothesis 3: Overconfident boards make safer CEO replacement decisions.

Hypothesis 3a: Overconfident boards prefer inside CEO replacements.
Hypothesis 3b: Overconfident boards prefer prior CEOs with greater reputation.

Hypothesis 3c: Overconfident boards prefer prior CEOs similar in nature to their composition, i.e. overconfident.

2.3. Sample Selection, Data Description, and Methodology

2.3.1. Sample Selection and Data Description

Our sample period is from 1996 to 2011. Data for our sample come from firm-years and director-years common in the following databases: Center for Research in Securities Prices (CRSP), Compustat, Execucomp, and Risk Metrics. Stock and accounting data for our sample come from CRSP and Compustat, respectively. We collect data on CEO compensation from the Execucomp database. Director data come from the Risk Metrics database. Because we are interested in the monitoring role of the board, we focus on only the independent directors on the board. Our final sample includes 114,052 independent director-year observations for 20,527 firm-years. Of these director observations, 17,776 are CEO-directors.

2.3.2. Research Design and Variable Definitions

We describe the empirical proxies employed in the analysis in this subsection. We then define the control variables.

2.3.2.1. Dependent Variables

The dependent variables at the director level include board attendance, number of independent directorships, directorships dropped, and committee participation. Board attendance is measured by an indicator if the director attended less than 75% of all board meetings during a year. The number of independent directorships is the count of directorships held, excluding the directorship at the firm where the director is simultaneously the CEO. Directorships dropped is one if the director's number of independent directorships is less than the prior year or zero otherwise. Committee participation is split into three indicators for membership on the audit, compensation, and nominating committees, respectively.

The dependent variables at the firm level include CEO tenure, CEO overconfidence, firm value, insider CEO, same-industry CEO, and the number of independent directorships. CEO tenure is the length of time in years the director has served at the current firm as CEO. CEO overconfidence is an indicator if the firm's CEO is overconfident. Tobin's Q is the sum of market capitalization, short-term liabilities, and long-term liabilities over the sum of stockholder's equity, short-term liabilities, and long-term liabilities. Insider CEO is an indicator if the CEO was an executive of the firm before becoming CEO within two years prior to his appointment. Same-industry CEO indicates the CEO was employed within the same industry as the firm in which he is now a CEO.

2.3.2.2. Independent Variables of Interest

We define overconfidence using the three measures used in Malmendier and Tate (2005, 2008). They are: holder67, longholder, and net buyer. Holder67 equals one if the CEO holds options for more than five years with a moneyness of 67% or greater. Longholder equals one if the CEO holds an option until the last year before expiration with moneyness of 40% or greater. Net buyer equals one if the CEO holds relatively more stock when compared to his stock position five years prior. At the director level, a CEO-director is considered overconfident if any of the three indicators equals one[5]. At the firm level, a board is considered overconfident if any of its CEO-directors are considered overconfident in that firm-year.

2.3.2.3. Control Variables

We use numerous control variables in our analysis to account for other boards, CEOs, and firm characteristics. We also include industry dummies at the two-digit SIC level and year

[5] We assume the character trait of overconfidence does not change once it is identified. Overconfidence changes only if a catastrophic event occurs, such as the firing of a CEO.

dummies. The following is a brief description of the control variables in our dataset. These variables are defined in the Appendix.

Board size is the number of directors on the board. Leverage is defined as total assets over stockholder's equity. Age is the age of the director in years. Percent ownership is the percentage of shares owned relative to total firm shares. Female is an indicator if the director is a female. Segments are the number of firm business segments. R&D / Assets are the research and development expense scaled by firm assets as a measure of investment. Research and development expense is set to zero if missing. Firm size is measured by the natural log of assets. Maximum board tenure is the largest board tenure of a director on the current year's board of directors. Audit membership indicates if the director is a member on the audit committee. Compensation membership indicates if the director is a member on the compensation committee. Nominating membership indicates if the director is a member on the nomination committee. ROA is return on asset defined as industry-adjusted net income scaled by total assets. Firm age is the number of years the firm has had data available in Compustat. Service indicates if the firm has a Fama-French industry code of 7, 11, 33, 34, or 44. Volatility is the standard deviation of monthly stock returns from the previous three years. Manufacturing indicates if the firm has a Fama-French industry code of 2-5, 8-10, 12-17, 19-26, 35, or 37-40. The Herfindahl index is the sum of squared percentage of industry sales of all firms in the same industry. The homogeneity index is the Parrino (1997) mean partial correlation proxy for industry similarity.

2.4. Empirical Results

In this section, we present summary statistics in Section 4.1 and examine CEO-director overconfidence in Section 4.2. Finally, in Section 4.3, we examine board overconfidence.

2.4.1. Summary Statistics

We begin with director-level summary statistics in Table 2.1. Panel A presents results for the full sample of independent directors. The average director is 56 years old, has board tenure of 7 years, and has 1.45 total directorships. The average independent director is also a member of the audit, compensation and nominating committee 47%, 45%, and 40% of the time, respectively. Twenty-six percent of these directors serve as a chairman on one of these committees. Eleven percent of the directors serve as Chairman of the Board. Twelve percent are female and 4% are overconfident.

Panel B considers the directors who are CEOs. CEO-directors comprise 16% of the independent directors. CEO-directors are vastly different than non-CEO directors. CEO-directors tend to be younger, attend more board meetings, have lower board tenure, and are more likely to be Chairman.

Panel C considers the overconfidence of CEO-directors. Of the CEO-directors, 6% are considered overconfident. The differences between overconfident and diffident CEO-directors are noticeable. Overconfident directors tends to be older, have more directorships, are more likely to be members of the nominating committees, and are less likely to be female.

Panel D provides a breakdown of directorships and overconfidence by industry. Industries with the largest amount of CEO-directors include chemicals, ship and railroad equipment, business supplies, and shipping containers. Industries with the smallest amount of CEO-directors include trading, tobacco products, and real estate. Industries with the largest amount of overconfident CEO-directors include ship and railroad equipment, real estate, and mining. According to our measurements of overconfidence, industries with no overconfident CEO-directors include agriculture, candy and soda, beer and liquor, tobacco products,

Table 2.1: Independent Director-Level Summary Statistics

This table provides summary statistics of the data at the independent director-level. Data is collected from Risk Metrics from 1996 to 2011. Panel A provides statistics for the full sample. Panel B examines differences between CEO-directors and non-CEO directors. Panel C considers directors who are CEOs at some point during the sample period and splits this subsample based on overconfidence. Panel D provides statistics of this subsample according to Fama-French 48 industry codes. All variables are defined in the Appendix.

Panel A: Full Sample

Variable	N	Mean	Median	Standard Deviation
Age	114052	56.01	56.00	8.87
Attend < 75%	114052	0.01	0.00	0.12
Board Tenure	114052	7.10	5.00	19.84
Independent Directorships	114052	1.45	1.00	0.87
Ownership %	114052	0.00	0.00	0.07
Audit Membership	114052	0.47	0.00	0.50
Compensation Membership	114052	0.45	0.00	0.50
Nominating Membership	114052	0.40	0.00	0.49
Committee Chair	114052	0.26	0.00	0.44
Chairman	114052	0.11	0.00	0.31
Female	114052	0.12	0.00	0.33
CEO Director	114052	0.16	0.00	0.36
Overconfident Director	114052	0.04	0.00	0.20

Panel B: Sample Means of Independent CEO-Directors and Non-CEO Directors

Variable	Non-CEO Director	CEO-Director	Difference	T-Stat	P-value
Number of Observations	*96276*	*17776*			
Age	56.05	55.78	0.27	3.66	<0.01
Attend < 75%	0.01	0.02	-0.01	-9.91	<0.01
Board Tenure	7.20	6.55	0.65	4.00	<0.01
Independent Directorships	1.45	1.45	0.00	0.38	0.70
Ownership %	0.00	0.00	0.00	2.25	0.02
Audit Membership	0.47	0.48	-0.02	-3.96	<0.01
Compensation Membership	0.44	0.50	-0.06	-15.19	<0.01
Nominating Membership	0.40	0.39	0.01	2.91	<0.01
Committee Chair	0.27	0.21	0.06	16.77	<0.01
Chairman	0.07	0.31	-0.23	-65.72	<0.01
Female	0.12	0.11	0.01	3.70	<0.01

Panel C: Sample Means of Independent Overconfident CEO-Directors and Non-Overconfident CEO-Directors

Variable	Non-OC CEO-Director	OC CEO-Director	Difference	T-Stat	P-value
Number of Observations	*16777*	*999*			
Age	55.76	56.22	-0.46	-1.89	0.06
Attend < 75%	0.02	0.02	0.00	1.70	0.09
Board Tenure	6.59	5.94	0.65	3.34	<0.01
Independent Directorships	1.44	1.61	-0.17	-5.36	<0.01
Ownership %	0.05	0.00	0.05	-0.57	0.57
Audit Membership	0.48	0.44	0.04	2.56	0.01
Compensation Membership	0.50	0.51	-0.01	-0.78	0.43
Nominating Membership	0.38	0.46	-0.08	-4.97	<0.01
Committee Chair	0.21	0.22	-0.01	-0.71	0.48
Chairman	0.31	0.24	0.07	4.64	<0.01
Female	0.12	0.06	0.06	5.76	<0.01

Panel D: Directorships and Overconfidence by Industry

Industry	N	CEO-Director	OC Director	Industry	N	CEO-Director	OC Director
Agriculture	38	0.32	0	Ship & Railroad Equipment	37	0.68	0.3
Food Products	401	0.51	0.03	Defense	86	0.36	0.03
Candy & Soda	56	0.35	0	Precious Metals	38	0.76	0
Beer & Liquor	70	0.66	0	Mining	78	0.56	0.13
Tobacco Products	44	0.2	0	Coal	39	0.46	0
Recreation	106	0.39	0.01	Petroleum & Natural Gas	790	0.46	0.03
Entertainment	139	0.21	0	Utilities	1267	0.46	0.03
Printing & Publishing	178	0.48	0.01	Communication	384	0.53	0.04
Consumer Goods	375	0.61	0.04	Personal Services	228	0.42	0.02
Apparel	296	0.34	0.04	Business Services	1855	0.37	0.02
Healthcare	308	0.3	0.01	Computers	660	0.39	0.02
Medical Equipment	544	0.38	0.02	Electronic Equipment	1240	0.36	0.03
Pharmaceutical Products	686	0.33	0.02	Measuring & Control Equipment	434	0.45	0.01
Chemicals	585	0.69	0.05	Business Supplies	399	0.68	0.04
Rubber & Plastic Products	111	0.52	0.06	Shipping Containers	95	0.68	0.01
Textiles	118	0.3	0.04	Transportation	539	0.42	0.03
Construction Materials	426	0.5	0.04	Wholesale	669	0.43	0.02
Construction	258	0.31	0.03	Retail	1342	0.39	0.03
Steel Works Etc.	341	0.51	0.05	Restaurants, Hotels, & Motels	390	0.35	0.01
Fabricated Products	35	0.43	0	Banking	1417	0.4	0.03
Machinery	815	0.61	0.04	Insurance	923	0.42	0.05
Electrical Equipment	230	0.52	0.08	Real Estate	21	0.24	0.14
Automobiles & Trucks	364	0.49	0.04	Trading	712	0.16	0.03
Aircraft	154	0.75	0.06	Other	136	0.34	0.05

entertainment, fabricated products, precious metals, and coal. Due to the variation across industry, we will include industry fixed effects or an industry homogeneity index (Parrino (1997)) in all regressions.

Table 2.2 Panel A provides firm-level statistics. In our sample of 20,527 firm-years, the average firm has assets of 15 billion, sales of 6 billion, a market cap of 8 billion, leverage of 0.19, six business segments, and Tobin's Q of 1.70. The average R&D investment level is around 3%. ROA is slightly positive during the sample period. The average firm is 27 years old with 10 members of the board. 69% of the board directors are independent. Nineteen percent of the boards and 2% of the CEOs are overconfident. Comparing to Malmendier and Tate (2005), they find at least 13% of their CEOs are overconfident. These large differences are likely due to our larger Execucomp sample from 1996 to 2011 versus their hand-collected sample of 477 large U.S. companies from 1980 to 1994.

Table 2.2 Panel B splits the firms by board overconfidence. Overconfident boards manage older firms with higher assets, sales, market cap, number of business segments, and ROA. Investment is lower for overconfident boards, which have more independent members. Eight percent of overconfident boards have an overconfident CEO.

2.4.2. Director Level: CEO-Director Overconfidence

In this section, we examine CEO-director overconfidence on several dependent variables. We employ the general model in equation (1) below to investigate the effect of independent director overconfidence:

$$Dep\ Var = a_0 + a_1\ (OC\ Director) + A_2\ (Controls) + \varepsilon\ (1)$$

Table 2.3 provides regressions of board attendance, where the dependent variable is an indicator if the CEO-director attended less than 75% of board meetings. In Models 1 and 4 we

Table 2.2: Firm-Level Summary Statistics

This table provides summary statistics at the firm-level. Data is collected from Compustat from 1996 to 2011. Panel A describes the full sample. Panel B splits the sample based on board overconfidence. All variables are defined in the Appendix.

Panel A: Full Sample

Variable	N	Mean	Median	Standard Deviation
Total Assets	20527	15007.08	1946.00	80645.26
Sales	20527	5806.32	1440.74	17420.35
Market Cap	20527	8091.58	1736.72	25061.67
Leverage	20527	0.19	0.16	0.17
Number of Segments	20527	6.02	3.00	5.63
Tobin's Q	20527	1.70	1.29	1.58
R&D / Assets	20527	0.03	0.00	0.06
Stock Return	20527	0.53	0.00	13.83
ROA	20527	0.04	0.04	0.15
Firm Age	20527	26.81	22.00	16.59
Board Size	20527	9.52	9.00	2.79
% Independent	20527	0.69	0.71	0.17
Overconfident Board	20527	0.19	0.00	0.39
Overconfident Firm CEO	20527	0.02	0.00	0.12
% Director Ownership	20527	0.00	0.00	0.00

Panel B: Sample Means Split by Board Overconfidence

Variable	Non-OC Board	OC Board	Difference	T-Stat	P-value
Number of Observations	*16710*	*3817*			
Total Assets	10413.3	35117.6	-24704.3	-10.40	<0.01
Sales	4338.2	12233.4	-7895.2	-17.81	<0.01
Market Cap	6039.9	17073.2	-11033.2	-16.84	<0.01
Leverage	0.19	0.20	-0.01	-3.42	<0.01
Number of Segments	5.81	6.92	-1.11	-10.10	<0.01
Tobin's Q	1.72	1.62	0.10	3.45	<0.01
R&D / Assets	0.03	0.02	0.01	6.55	<0.01
Stock Return	0.55	0.42	0.13	0.52	0.61
ROA	0.03	0.04	-0.01	-3.42	<0.01
Firm Age	24.99	34.76	-9.77	-31.16	<0.01
Board Size	9.24	10.73	-1.50	-29.64	<0.01
% Independent	0.67	0.77	-0.10	-32.79	<0.01
Overconfident CEO	0.00	0.08	-0.08	-18.18	<0.01
Overconfident Director Count	0.00	1.16	-1.14	-57.67	<0.01
% Director Ownership	0.00	0.00	0.00	5.48	<0.01

Table 2.3: Board Attendance

This table provides logistic regressions of board attendance. The dependent variable is an indicator if the director attended less than 75% of board meetings. Models 1-3 are for the full sample. Models 4 -6 only includes CEO-directors. The main independent variable of interest is Overconfident Director, which indicates if the director is overconfident. All other controls are defined in the appendix. All models use heteroskedastic-robust standard errors clustered by director in brackets. All models include industry-fixed effects at the two-digit SIC level. Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
OC Director	-0.546***	-0.585***	-0.570***	-0.481*	-0.491*	-0.474*
	[0.169]	[0.167]	[0.167]	[0.269]	[0.268]	[0.268]
CEO Director	0.760***	0.733***	0.752***			
	[0.065]	[0.066]	[0.067]			
Busy	0.292***	0.239***	0.243***	0.183	0.178	0.181
	[0.083]	[0.084]	[0.084]	[0.157]	[0.157]	[0.158]
Age	0	-0.001	-0.001	-0.017**	-0.017**	-0.018**
	[0.004]	[0.004]	[0.004]	[0.008]	[0.008]	[0.008]
Audit Membership	-0.641***	-0.531***	-0.508***	-0.215*	-0.193	-0.185
	[0.062]	[0.064]	[0.064]	[0.117]	[0.120]	[0.120]
Compensation Membership	-0.381***	-0.269***	-0.253***	-0.073	-0.052	-0.042
	[0.063]	[0.068]	[0.068]	[0.118]	[0.120]	[0.121]
Nominating Membership	-0.683***	-0.590***	-0.565***	-0.288**	-0.270**	-0.258**
	[0.067]	[0.073]	[0.073]	[0.113]	[0.117]	[0.119]
CEO Ownership	-1.533	-0.717	-0.859	0.217	0.277	0.013
	[1.452]	[0.669]	[0.784]	[0.834]	[0.731]	[1.038]
Female	-0.308***	-0.345***	-0.332***	-0.226	-0.238	-0.251
	[0.099]	[0.099]	[0.099]	[0.183]	[0.182]	[0.179]
Board Size		0.064***	0.070***		0.016	0.018
		[0.010]	[0.010]		[0.020]	[0.020]
Board Tenure		-0.021***	-0.019***		-0.007	-0.006
		[0.006]	[0.006]		[0.009]	[0.009]
Leverage			0.642***			0.952**
			[0.209]			[0.408]

Tobin's Q			-0.009			-0.03
			[0.028]			[0.048]
Segments			-0.020***			-0.011
			[0.007]			[0.015]
R&D / Assets			1.142***			-0.582
			[0.360]			[0.955]
ROA			-0.224***			-0.206
			[0.079]			[0.174]
Constant	-3.087***	-3.716***	-3.634***	-2.566***	-2.693***	-2.700***
	[0.495]	[0.538]	[0.545]	[0.629]	[0.648]	[0.680]
Observations	112007	112007	112004	16780	16780	16778
Pseudo R^2	0.05	0.05	0.06	0.03	0.03	0.03
F-test of OC Director + CEO Director = 0	143.55***	133.18***	136.11***			

include only director characteristics. In Models 2 and 5 we introduce additional board characteristics and in models 3 and 6 we include firm characteristics. We find in the first three models for the full sample that overconfidence leads directors to miss fewer board meetings. Conversely, non-overconfident CEO-directors miss more meetings. In Models 1 and 2, the coefficient for overconfident CEO-directors decreases from -0.55 to -0.59, respectively, as more board controls are added. According to Model 3, the average overconfident CEO-director is 0.5% more likely to attend 75% or more of the meetings. On average, the predicted likelihood of missing 75% or more of the meetings is 0.8%. Thus, this finding marginally contributes to our understanding of board attendance.

We also find evidence consistent with prior studies that busy directors and directors who are also a CEO in another firm miss significantly more meetings, consistent with their additional responsibilities distracting them from their director responsibilities. However, when a CEO director is also overconfident, our evidence suggests that these directors actually do not miss more meeting as do other CEO-directors, but instead we find the opposite effect. We consider the subsample of CEO-directors in the final three models. We continue to find evidence (at the 10% level) that overconfident CEO-directors are less likely to miss board meetings relative to non-overconfident CEO-directors. Thus, the overconfidence effect in the full sample is not being driven by the non CEO-directors. This evidence reveals one important difference between overconfident and non-overconfident directors is their level of activity on the board.

Next, we examine another measure of board involvement, committee membership. Table 2.4 provides logistic models of committee participation. Models 1-3 consider the full sample of independent directors. Models 4-6 only consider CEO-directors. Models 1 and 4 only include

Table 2.4: Committee Participation

This table provides logistic regressions of committee participation. Panels A, B, and C provide regressions for audit committee membership, compensation committee membership, and nominating committee membership, respectively. Models 1-3 use the full sample. Models 4-6 restrict the sample to CEO-directors. The main independent variable of interest is Overconfident Director, which indicates if the director is overconfident. All other controls are defined in the appendix. All models use heteroskedastic-robust standard errors clustered by director in brackets. All models include industry-fixed effects at the two-digit SIC level. Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

Panel A: Audit Committee Participation

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
OC Director	-0.102**	-0.026	-0.043	-0.104	-0.065	-0.064
	[0.045]	[0.046]	[0.046]	[0.094]	[0.093]	[0.094]
CEO Director	0.151***	0.183***	0.112***			
	[0.025]	[0.025]	[0.025]			
Busy	-0.169***	-0.077***	-0.104***	-0.209***	-0.139*	-0.130*
	[0.028]	[0.028]	[0.029]	[0.072]	[0.074]	[0.074]
Age	-0.007***	-0.001	0	-0.004	0.001	0.001
	[0.001]	[0.001]	[0.001]	[0.003]	[0.003]	[0.003]
CEO Ownership	-0.726*	-0.858	-0.97	-0.282	-0.598	-0.602
	[0.434]	[0.651]	[0.902]	[1.010]	[1.807]	[1.847]
Female	-0.064**	0.007	-0.009	-0.055	0.002	0.009
	[0.029]	[0.030]	[0.030]	[0.070]	[0.071]	[0.071]
SOX	0.542***	0.501***	0.427***	-0.300***	-0.319***	-0.314***
	[0.018]	[0.018]	[0.020]	[0.040]	[0.040]	[0.042]
Board Size		-0.126***	-0.132***		-0.115***	-0.111***
		[0.004]	[0.004]		[0.010]	[0.010]
Leverage			-0.017			-0.151
			[0.064]			[0.150]
Tobin's Q			0.180***			0.014
			[0.010]			[0.014]
Segment			0.025***			0.005

			[0.002]			[0.004]
R&D / Assets			-1.653***			-0.991**
			[0.214]			[0.448]
Log (Assets)			0.008			-0.029*
			[0.007]			[0.017]
ROA			-0.476***			0.14
			[0.074]			[0.122]
Constant	0.081	1.100***	0.561***	-0.188	0.810*	1.021**
	[0.228]	[0.204]	[0.214]	[0.465]	[0.432]	[0.452]
Observations	112390	112390	112387	17562	17562	17560
Pseudo R^2	0.02	0.04	0.05	0.02	0.03	0.04

Panel B: Compensation Committee Participation

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
OC Director	0.038	0.113**	0.119***	0.063	0.09	0.092
	[0.045]	[0.045]	[0.046]	[0.093]	[0.094]	[0.095]
CEO Director	0.339***	0.374***	0.322***			
	[0.025]	[0.025]	[0.025]			
Busy	0.108***	0.203***	0.203***	0.146**	0.197***	0.199***
	[0.028]	[0.029]	[0.029]	[0.069]	[0.071]	[0.071]
Age	-0.002**	0.004***	0.004***	-0.003	0.001	0.001
	[0.001]	[0.001]	[0.001]	[0.003]	[0.003]	[0.003]
CEO Ownership	0.255**	0.263***	0.264***	-1.658	-2.373	-2.184
	[0.106]	[0.096]	[0.088]	[1.743]	[2.147]	[2.056]
Female	-0.218***	-0.154***	-0.159***	-0.361***	-0.325***	-0.319***
	[0.029]	[0.029]	[0.029]	[0.072]	[0.072]	[0.072]
SOX	0.549***	0.509***	0.475***	-0.152***	-0.167***	-0.158***
	[0.019]	[0.019]	[0.020]	[0.040]	[0.040]	[0.042]
Board Size		-0.121***	-0.115***		-0.081***	-0.078***
		[0.004]	[0.005]		[0.009]	[0.010]
Leverage			-0.009			-0.237
			[0.065]			[0.150]
Tobin's Q			0.165***			0.018
			[0.010]			[0.013]
Segment			0.021***			-0.002
			[0.002]			[0.004]
R&D / Assets			-1.517***			0.106
			[0.243]			[0.381]
Log (Assets)			-0.031***			-0.01
			[0.007]			[0.017]
ROA			-0.361***			0.162
			[0.062]			[0.115]
Constant	-0.629***	0.329	0.09	0.032	0.764**	0.870**
	[0.225]	[0.241]	[0.249]	[0.346]	[0.332]	[0.353]
Observations	112390	112390	112387	17567	17567	17565
Pseudo R^2	0.02	0.04	0.04	0.01	0.02	0.02

Panel C: Nominating Committee Participation

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
OC Director	0.078*	0.119**	0.095**	0.256***	0.266***	0.239***
	[0.046]	[0.046]	[0.047]	[0.090]	[0.090]	[0.090]
CEO Director	0.147***	0.165***	0.128***			
	[0.026]	[0.026]	[0.026]			
Busy	0.262***	0.313***	0.285***	0.482***	0.501***	0.477***
	[0.030]	[0.030]	[0.031]	[0.072]	[0.072]	[0.073]
Age	0.004***	0.007***	0.006***	0.006**	0.007**	0.007**
	[0.001]	[0.001]	[0.001]	[0.003]	[0.003]	[0.003]
CEO Ownership	0.037	0.047	0.075	-1.068	-1.247	-0.831
	[0.084]	[0.084]	[0.081]	[1.265]	[1.567]	[1.001]
Female	0.088***	0.125***	0.110***	0.114	0.129*	0.119*
	[0.029]	[0.030]	[0.030]	[0.071]	[0.072]	[0.072]
SOX	1.423***	1.403***	1.345***	0.758***	0.754***	0.690***
	[0.022]	[0.023]	[0.024]	[0.044]	[0.044]	[0.047]
Board Size		-0.068***	-0.079***		-0.030***	-0.047***
		[0.004]	[0.005]		[0.009]	[0.010]
Leverage			0.179***			-0.136
			[0.067]			[0.156]
Tobin's Q			0.081***			-0.023
			[0.010]			[0.016]
Segment			0.012***			0.010**
			[0.002]			[0.004]
R&D / Assets			-1.239***			-0.301
			[0.223]			[0.435]
Log (Assets)			0.029***			0.043**
			[0.008]			[0.018]
ROA			0.134**			0.643***
			[0.059]			[0.210]
Constant	-2.293***	-1.691***	-2.115***	-0.945***	-0.669*	-0.917**
	[0.225]	[0.234]	[0.239]	[0.348]	[0.363]	[0.382]
Observations	112372	112372	112369	17562	17562	17560
Pseudo R^2	0.07	0.08	0.08	0.04	0.04	0.04

director controls. Models 2 and 5 include board size, and Models 3 and 6 include all regressors, including firm controls.

In Panel A the dependent variable is membership on the audit committee. We find a negative but insignificant relationship between director overconfidence and audit committee participation across all models. In Panel B we report results when the dependent variable equals one if the director is a compensation committee member. We find some evidence of overconfident directors being more likely to serve on the board's compensation committee, specifically, in models 2 and 3. In Panel C we report results for when the dependent variable equals one if the independent director serves on the nominating committee. In all specification, we find a positive and significant coefficient estimate for overconfident directors. This is an interesting result, given the nominating committee's role in effecting the future composition of the board and in selecting important firm executives.

Turning to the other controls, we find CEO-Directors are more likely to participate in all three of these key committees. Busy directors (Fich and Shivdasani (2006)) are less likely to participate in audit committees but more likely to participate in compensation and nominating committees. In addition, post-Sarbanes-Oxley, independent directors increase participation on all three of these key committees. Thus far, the evidence in Tables 3 and 4 suggests that overconfident directors are active on the boards where they serve as independent directors. They attend meetings and participate in important committees. Thus, their greater effort can increase their value as directors for shareholders in other firms. Next, we consider this hypothesis more directly by examining the demand for their director services.

Table 2.5 provides Tobit[1] regressions concerning the count of the number of independent directorships held by the CEO-director in the current year. We modify the general equation (1) by including additional controls: board tenure, and indicators for audit, compensation, and nomination committee memberships. Models 1-3 consider the full sample; Models 4-6 only use the CEO-director subsample. Models 1 and 4 only include director controls. Models 2 and 5 add board controls, and Models 3, 6, and 7 include all regressors, including firm controls. In all specifications, we find a statistically positive relationship between CEO-director overconfidence and the number of independent directorships at the 1% level. This is consistent with overconfident CEO-directors being more valuable in the director labor market, perhaps due to their reputation for being an active participant on the boards where they serve. Model 7 includes a logistic regression with busy as the dependent variable. We find statistically similar results. Generally, across all models, the number of outside directorships is also higher for directors who are older, busy, members of the nominating committee, females, on larger boards, and at larger firms. The number of outside directorships is lower for directors at firms whose CEOs have lower ownership, after the Sarbanes-Oxley Act, and for those with longer board tenures. We also test these using Poisson and OLS specifications and find statistically similar results.

2.4.3. Director Level: Multiple Overconfident Directors

In the previous sections, the evidence indicates that overconfident directors behave differently from other directors. In this section, we examine whether their overconfidence can affect the actions of other directors on their board. Specifically, we examine director attendance when there are multiple overconfident directors present. This aspect is important since group influence increases as members' confidence increases (Sniezek and Zarnoth (1997)). "Overconfidence may

[1] We censor the lower limit at one since all directors in our sample have at least one directorship.

Table 2.5: Number of Independent Directorships

This table provides analysis of the number of independent directorships. For Tobit Models 1-6, the dependent variable is the number of independent directorships held in the current year. The dependent variable in logistic Model 7 is "busy," indicating if the director has three or more independent directorships. Models 1-3 and Model 7 include the full sample. Models 4-6 only include CEO-directors. The main independent variable of interest is Overconfident Director, which indicates if the director is overconfident. All other controls are defined in the appendix. All models use heteroskedastic-robust standard errors clustered by director in brackets. All models include industry-fixed effects at the two-digit SIC level. Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
OC Director	0.299***	0.268***	0.202***	0.378***	0.360***	0.324***	0.390***
	[0.033]	[0.033]	[0.033]	[0.065]	[0.065]	[0.066]	[0.080]
CEO Director	-0.003	-0.021	-0.060***				-0.293***
	[0.019]	[0.019]	[0.019]				[0.046]
Busy	3.342***	3.303***	3.225***	3.408***	3.383***	3.318***	
	[0.034]	[0.034]	[0.033]	[0.085]	[0.085]	[0.082]	
Age	0.010***	0.009***	0.009***	0.004*	0.003	0.002	0.019***
	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]
Audit Membership	-0.048***	0.012	0.005	-0.044	0.007	0.012	-0.043
	[0.013]	[0.013]	[0.013]	[0.033]	[0.034]	[0.033]	[0.030]
Compensation Membership	-0.048***	0.015	0.019	0.055*	0.102***	0.110***	0.200***
	[0.014]	[0.014]	[0.014]	[0.033]	[0.033]	[0.033]	[0.030]
Nominating Membership	0.097***	0.139***	0.130***	0.055*	0.079**	0.070**	0.261***
	[0.014]	[0.014]	[0.014]	[0.033]	[0.034]	[0.033]	[0.031]
CEO Ownership	-2.523***	-1.749***	-1.040**	-9.909**	-7.859**	-5.277*	-3.713**
	[0.656]	[0.582]	[0.446]	[4.015]	[3.385]	[2.722]	[1.837]
Female	0.211***	0.178***	0.143***	0.165***	0.138**	0.107*	0.512***
	[0.024]	[0.024]	[0.024]	[0.061]	[0.061]	[0.061]	[0.053]
SOX	-0.094***	-0.064***	-0.173***	-0.153***	-0.138***	-0.239***	-0.804***
	[0.017]	[0.017]	[0.017]	[0.034]	[0.034]	[0.036]	[0.038]
Board Size		0.049***	0.017***		0.051***	0.019***	0.026***
		[0.003]	[0.003]		[0.006]	[0.007]	[0.006]

Board Tenure		-0.011***	-0.011***		-0.009***	-0.008***	-0.014***
		[0.001]	[0.001]		[0.003]	[0.003]	[0.003]
Leverage			0.068			0.043	-0.032
			[0.049]			[0.122]	[0.109]
Tobin's Q			0.012**			-0.016	0.040***
			[0.005]			[0.011]	[0.011]
Segments			0			-0.001	0.002
			[0.001]			[0.003]	[0.003]
R&D / Assets			0.022			-0.042	-0.935**
			[0.147]			[0.334]	[0.365]
Log (Assets)			0.133***			0.139***	0.353***
			[0.006]			[0.014]	[0.013]
ROA			-0.029			-0.135	-0.104
			[0.038]			[0.092]	[0.088]
Constant	-0.271	-0.757***	-1.702***	0.294	-0.297	-1.289***	-6.978***
	[0.207]	[0.225]	[0.247]	[0.329]	[0.310]	[0.325]	[0.354]
Observations	112390	112390	112387	17567	17567	17565	112164
Pseudo R^2	0.25	0.26	0.26	0.25	0.26	0.26	0.09

be particularly beneficial in implementing a specific decision and persuading others to be enthusiastic about it as well (Barney and Busenitz (1997)).”

We test this by using a multivariate conditional logistic model in order to incorporate firm fixed effects since we are interested in the within firm variation in attendance conditioning on the presence of multiple overconfident directors. As a result of the firm fixed effect we lose a large number of observations of firms that do not experience any variation in the presence of multiple overconfident directors. Table 2.6 reports the results with standard errors robust to heteroskedasticity reported in parentheses. We find the group confidence effect is larger than the individual’s own overconfidence. Multiple OC indicates if a director is serving on a board with two or more overconfident directors. For all directors in the first three models, we find multiple overconfident directors on the board contribute to higher attendance at the 1% level. Models 4 through 6 demonstrate the effect is statistically significant at the 10% level for the CEO-director subsample. Thus, multiple overconfident directors are associated with greater attendance by other directors within the firm. So, not only are overconfident directors less likely to miss meetings, the other members of their board are also less likely to miss meetings, relative to when there is only one or no overconfident directors on the board.

2.4.4. Firm Level: Board Overconfidence

In this section we aggregate our overconfidence director measure to the board level and examine important board decisions. Our primary measure is an indicator variable that equals one if the board has at least one overconfident director and zero otherwise. Given the previous finding that overconfident directors are more likely to serve on the nominating committee, we start by examining one of the most important board functions: selecting a CEO following a CEO turnover event. We report several univariate analyses results in Table 2.7. There are a total of 2,578

Table 2.6: Multiple Overconfident Directors' Effect on Board Attendance

This table provides conditional logistic regressions of board attendance. The dependent variable is an indicator if the director attended less than 75% of board meetings. Models 1-3 are for the full sample. Models 4 -6 only includes CEO-directors. The main independent variable of interest is Multiple OC, which indicates if more than one director on the board is overconfident. All other controls are defined in the appendix. All models use heteroskedastic-robust standard errors Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

	Model 1 Attend < 75%	Model 2 Attend < 75%	Model 3 Attend < 75%	Model 4 Attend < 75%	Model 5 Attend < 75%	Model 6 Attend < 75%
OC Exec	0.106	0.108	0.108	-0.053	-0.057	-0.053
	[0.205]	[0.206]	[0.207]	[0.296]	[0.298]	[0.301]
OC Director Present	-0.902***	-0.907***	-0.895***	-0.561**	-0.556**	-0.574**
	[0.141]	[0.146]	[0.147]	[0.252]	[0.253]	[0.257]
CEO Director	0.615***	0.616***	0.606***			
	[0.083]	[0.084]	[0.085]			
Busy	0.230**	0.219**	0.213*	0.251	0.262	0.26
	[0.111]	[0.111]	[0.111]	[0.222]	[0.221]	[0.224]
Age	-0.003	-0.001	-0.001	-0.018*	-0.016	-0.016
	[0.004]	[0.004]	[0.004]	[0.009]	[0.010]	[0.010]
Audit Membership	-0.490***	-0.408***	-0.420***	-0.204	-0.19	-0.188
	[0.073]	[0.075]	[0.074]	[0.153]	[0.155]	[0.155]
Compensation membership	-0.211***	-0.119	-0.133	-0.003	0.022	0.028
	[0.075]	[0.082]	[0.082]	[0.145]	[0.149]	[0.151]
Nominating Membership	-0.448***	-0.361***	-0.363***	-0.260*	-0.236	-0.253
	[0.087]	[0.095]	[0.095]	[0.154]	[0.157]	[0.156]
% Ownership	-4.045	-3.32	-3.664	-4.938	-4.483	-4.877
	[2.796]	[2.657]	[2.683]	[6.765]	[6.743]	[6.727]
Female	-0.213*	-0.222*	-0.222*	-0.375*	-0.381*	-0.386*
	[0.113]	[0.114]	[0.114]	[0.201]	[0.202]	[0.203]
Board Size		0.092***	0.093***		0.04	0.043
		[0.022]	[0.022]		[0.053]	[0.054]

Board Tenure		-0.020***	-0.021***		-0.012	-0.011
		[0.007]	[0.008]		[0.013]	[0.013]
Leverage			0.549			0.887
			[0.539]			[1.027]
Tobin's Q			0.065			0.132*
			[0.042]			[0.071]
Segment			-0.005			0.028
			[0.014]			[0.032]
R&D / Assets			0.603			-4.469
			[0.948]			[3.305]
ROA			0.055			0.251
			[0.543]			[1.021]
Observations	38715	38715	38709	4053	4053	4053
Pseudo R^2	0.03	0.03	0.04	0.01	0.01	0.02

Table 2.7: Board CEO Selection Preferences

This table provides univariate analysis of a subsample of CEO turnovers split by board overconfidence during our sample period. The means of each variable given the full sample of firms, full subsample of turnovers, and the subsample split by board overconfidence are below. All variables are defined in the Appendix.

Variable	Full Sample	CEO Turnover Sample	Non-OC Board	OC Board	Difference	T-stat	P-value
Number of Observations	*20527*	*2578*	*2128*	*450*			
CEO Turnover	0.126	1.00					
New CEO Characteristics							
Age	53.78	50.67	50.61	50.94	-.034	-0.51	0.61
Prior CEO Experience	0.112	0.123	0.094	0.256	-0.161	-7.48	<0.01
Number of Independent Directorships	1.39	1.43	1.37	1.71	-0.34	-6.26	<0.01
Same Industry (4-digit SIC)	0.07	0.07	0.06	0.09	-0.03	-2.13	0.03
Insider	0.22	0.24	0.21	0.38	-0.17	-6.89	<0.01
Overconfident CEO	0.02	0.01	0.00	0.06	-0.06	-5.41	<0.01

turnover events in our sample period from 1996 to 2011. We find overconfident boards tend to replace the CEO with one who has prior CEO experience, more independent directorships (a reputation proxy), from the same industry (at the 4-digit SIC level), is a company insider, and is overconfident.

To test this in a multivariate setting, we use propensity-score matching (PSM) to address any potential endogeneity concerns. Firms may pick overconfident directors for a specific reason, which would affect outcomes we observe. In a perfect world, we could test the same firm with and without an overconfident CEO-director. Since this is not possible, we use the PSM method in order to account for other factors contributing to picking an overconfident director and match each firm with an overconfident board (treatment firm) to a control firm that is as similar to the treatment firm as possible but without an overconfident board. We take from the previous literature on determinants of an overconfident CEO (Hirschleifer et al. (2011)) to provide insight into selection of overconfident directors. We also draw from other studies on determinants of board composition (e.g. Fahlenbrach et al. (2010)). Specifically, we include presence in an innovative industry, firm leverage, firm value, acquisition activity, and accounting measures, including intangible issues, assets, research and development expenses, capital expenditures, sales growth, return on assets, stock return, leverage, Tobin's Q, and acquisition activity.

Table 2.8 provides the results using our full and matched samples. Models 1 and 4 include board controls. Models 2 and 6 include CEO duality as Chairman; Models 3 and 6 include all regressors, including firm and overconfident CEO-correlated regressors. We find significance for several controls throughout the full sample. Overconfident boards are more likely as the percentages of CEO-directors, insiders, and former-CEO directors are higher. Overconfident boards are also highly correlated with larger boards, larger and older firms, higher

Table 2.8: Propensity-Score Matching Model

This table provides the model used to generate propensity scores. The treatment is Overconfident Board, indicating if at least one member of the Board of Directors is an overconfident independent CEO Director. Models 1-3 are for the full sample. Model 4-6 are for the matched sample. Acq / assets is the cash flow from acquisitions scaled by assets. Intangible is the intangible assets scaled by assets. Innovative indicates if a firm is an industry with two-digit SIC 10, 13, 16, 25, 48, or 50. All other controls are defined in the appendix. Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

	Model 1 Full Sample	Model 2 Full Sample	Model 3 Full Sample	Model 4 Matched Sample	Model 5 Matched Sample	Model 6 Matched Sample
% CEO Director	5.182***	5.151***	4.344***	0.184	0.183	0.107
	[0.224]	[0.224]	[0.232]	[0.249]	[0.249]	[0.254]
% Insider	2.413***	2.414***	2.131***	-0.154	-0.153	-0.213
	[0.130]	[0.130]	[0.135]	[0.158]	[0.158]	[0.161]
% Former CEO Director	1.543***	1.526***	1.194***	0.008	0.007	-0.007
	[0.333]	[0.333]	[0.340]	[0.377]	[0.377]	[0.379]
Board Size	0.187***	0.186***	0.084***	-0.012	-0.012	-0.023**
	[0.007]	[0.007]	[0.009]	[0.008]	[0.008]	[0.010]
CEO Director Left	0.149	0.139	0.161	11.768	11.766	12.648
	[0.689]	[0.692]	[0.816]	[340.482]	[340.484]	[527.062]
Former CEO Director Left	0.066	0.057	0.113	11.73	11.728	12.612
	[0.689]	[0.692]	[0.816]	[340.482]	[340.484]	[527.062]
Board Member Left	-0.033	-0.024	-0.105	-11.763	-11.761	-12.647
	[0.688]	[0.691]	[0.816]	[340.482]	[340.484]	[527.062]
Inside Director Left	0.089	0.081	0.122	11.765	11.764	12.646
	[0.688]	[0.692]	[0.816]	[340.482]	[340.484]	[527.062]
Other Director Left	0	-0.009	0.055	11.736	11.734	12.619
	[0.688]	[0.692]	[0.816]	[340.482]	[340.484]	[527.062]
Chairman		0.120***	0.046		0.005	-0.015
		[0.040]	[0.041]		[0.047]	[0.048]
Log (CEO Age)			-0.114***			0.056*
			[0.026]			[0.029]

Log (Assets)			0.227***			0.018
			[0.016]			[0.018]
Log (Firm Age)			0.355***			0.076*
			[0.036]			[0.042]
R&D / Assets			1.297***			-0.519
			[0.400]			[0.394]
Capital Expenditures			0.053			0.124
			[0.402]			[0.509]
Sales Growth			-0.334***			-0.091
			[0.093]			[0.099]
ROA			0.979***			-0.01
			[0.241]			[0.302]
Stock Return			0			-0.001
			[0.001]			[0.002]
Dividend Payer			0.117**			0.002
			[0.054]			[0.065]
Blockholder			-0.519*			-0.14
			[0.302]			[0.382]
Leverage			-0.004			0.086
			[0.135]			[0.164]
Tobin's Q			-0.002			0.024
			[0.020]			[0.026]
ACQ / Assets			-0.633			0.445
			[0.397]			[0.487]
Intangible			0.590***			0.1
			[0.128]			[0.144]
Innovative			0.001			-0.110*
			[0.059]			[0.067]
Constant	-3.132***	-3.171***	-4.592***	0.114	0.113	-0.348
	[0.098]	[0.099]	[0.211]	[0.110]	[0.112]	[0.237]
Observations	20392	20392	20390	7540	7540	7540
Pseudo R^2	0.16	0.16	0.18	0	0	0

investment and return, firms who pay dividends, and firms with a larger percentage of intangible assets. Overconfident boards are less likely with older CEOs, lower sales, and if a large blockholder exists. The Psuedo-R^2 of Model 3 for the full sample is 18%, which is much larger than 0% for Model 6 for the matched sample. Also, very few controls are significant or have meaningful coefficient estimates in Model 6. Thus, our model sufficiently matches propensity scores of boards treated by overconfidence.

We now use this matched sample to examine the characteristics of the new CEO selected in a multivariate setting. We employ a model similar to Mobbs and Raheja (2012), who model CEO selection outcomes among firm executives. Specifically, our model is as follows:

$$Dep\ Var = a_0 + a_1\ (OC\ Board_{t-1}) + a_2\ (Log(Assets_{t-1})) + a_3\ (Log(Segments_{t-1})) + a_4\ (Log(Firm\ Age_{t-1})) + a_5\ (Service_{t-1}) + a_6\ (Volatility_{t-1}) + a_1\ (Manufacturing_{t-1}) + a_2\ (Homogeneity\ Index_{t-1}) + a_3\ (Herfindahl\ Index_{t-1}) + \varepsilon \quad (2)$$

Table 2.9 reports the results for each tests of the new CEO characteristics we examine. We find the results hold as before except for same industry. Overconfident boards find a new CEO who has prior CEO experience, a higher reputation (as measured by her number of independent directorships), is a company insider, and who is overconfident. These results are consistent with overconfident directors seeking CEOs candidates who have greater available information about their ability, which makes the decision less risky. This is consistent with their investing less in gathering information (Goel and Thakor (2008)), but want to make successful choices (Miller and Ross (1975)) for the new CEO. Finally, these findings contribute to the recent findings by Banerjee et al. (2014) that overconfident executives are more likely to be selected as CEO, by uncovering the role of overconfident board members in the selection of an overconfident CEO.

Table 2.9: Matched Sample Regressions of Board CEO Selection Preferences

This table provides CEO turnover regressions using a matched sample with propensity-score matching using the model in Table 2.7. The top of each column lists the dependent variable of interest. All variables are defined in the appendix. All independent variables are lagged. All models use heteroskedastic-robust standard errors clustered by firm in brackets. All models include year dummies. Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

	Age	Prior CEO	Ind Directorships	Same Industry	Insider	OC CEO
OC Board	-0.127	0.772***	0.480**	0.53	0.420**	1.776***
	[1.116]	[0.256]	[0.192]	[0.347]	[0.208]	[0.525]
Log (Assets)	0.885***	0.041	0.347***	0.249***	0.079	-0.192
	[0.313]	[0.066]	[0.061]	[0.077]	[0.059]	[0.148]
Log (Segments)	0.634	-0.057	-0.176*	-0.01	-0.152	0.239
	[0.538]	[0.124]	[0.096]	[0.139]	[0.103]	[0.205]
Log (Firm Age)	-1.03	0.600**	-0.053	0.228	0.498**	-0.387
	[1.191]	[0.291]	[0.181]	[0.329]	[0.213]	[0.390]
Service	-2.449	0.461	-0.727**	0.347	0.218	-0.289
	[1.903]	[0.401]	[0.317]	[0.433]	[0.315]	[0.717]
Volatility	-8.445	-3.387	-3.311	0.041	-1.324	-3.151
	[10.207]	[2.219]	[2.044]	[3.619]	[1.842]	[3.043]
Manufacturing	0.848	0.464	0.387	-0.254	0.278	0.264
	[1.156]	[0.297]	[0.236]	[0.389]	[0.238]	[0.432]
Homogeneity Index	-5.166	11.553	23.147	41.983	-7.915	-147.485
	[80.985]	[22.764]	[16.038]	[25.827]	[19.409]	[226.115]
Herfindahl Index	-1.383	-2.915	-1.933	-1.536	-0.14	-4.255
	[1.231]	[2.615]	[1.370]	[2.083]	[0.396]	[8.954]
% Independent	0.33	-0.03	-0.686	-2.162**	-1.644**	-2.394*
	[3.761]	[0.848]	[0.725]	[0.974]	[0.704]	[1.247]
Constant	46.603***	-3.876***	-1.342	-4.114***	-1.752**	0.359
	[6.253]	[1.247]	[0.858]	[1.349]	[0.888]	[1.982]
Observations	753	753	753	753	753	753
R^2/Pseudo R^2	0.02	0.07	0.05	0.05	0.04	0.12

2.5. Robustness Checks

Throughout the robustness analysis our models incorporate heteroskedastic-robust standard errors clustered by director or firm. All regressions include year-fixed effects or an indicator for years after the Sarbanes-Oxley regulation and industry-fixed effects (at the two-digit SIC level) or controls for industry characteristics using the Herfindahl index and homogeneity index.

All models use the lag of board overconfidence to ensure there are no endogenous effects due to the positive correlation between overconfident boards and overconfident CEOs. Unlike the CEO-director trait of overconfidence, boards can swap from overconfident to diffident. Thus, the overconfident board measure can be endogenous due to dependence on prior years, but endogeneity is nonexistent for the fixed effect of CEO-director overconfidence.

In all models we run regressions analyzing the results using only CEO-directors. This reduces our sample by over half in all models. All models are robust to this restriction except for Table 2.3 with respect to board attendance.

We consider CEO-director firm effects, such as CEO tenure, firm size, firm age, Herfindahl index, homogeneity index, volatility, and segments, in the director-level models. We find statistical significance in all models and the same conclusions. We consider firm size decile dummies to replace the size variable, Log (Assets), for the turnover models. We find similar statistical results for all regressions.

2.6. Other Tests

Next, we analyze a firm's net debt issues, known to be associated with an overconfident CEO to determine whether overconfident boards mitigate or enhance this association. We also

examine the positive relation between CEO-directors and CEO pay to see to what degree, if any, overconfident CEO-directors contribute to these findings.

Following Malmendier and Tate (2011), we test the effect of board overconfidence on a company's net debt issues, defined as the difference between long-term debt issues and long-term debt reduction, scaled by total assets. Model 1 of Table 2.10 replicates Model 6 from Table 5 in Malmendier and Tate (2011). In our sample, we find no relationship between a CEO who is overconfident and the company's net debt issues. Model 2 utilizes our new variable of OC Board, where we find a statistically negative relationship at the 5% level, suggesting overconfident boards mitigate the overall use of company debt. Model 3 considers both overconfident CEOs and overconfident boards. Separately, overconfident CEOs and overconfident boards use more external financing, but companies with both overconfident CEOs and overconfident boards use less external financing, which suggests a lack of monitoring effect to reduce firm value by increasing firm risk through potentially suboptimal financing decisions. This is consistent with the idea of group shift, whereby one individual can lead a group to make the same decision as he would without group consideration (Ambrus et al. (2009)).

Following Fahlenbrach et al. (2011), we test the effect of board overconfidence on CEO compensation. Specifically, we look at the CEO's salary. Model 1 of Table 2.11 replicates Model 3 of Table 7 in Fahlenbrach et al. (2011). We find similar results since companies pay the CEO more if a CEO-director sits on the board. Model 2 decomposes CEO-directors into those who are overconfident and those who are not. The coefficient estimate for CEO-director presence is still positive it is no longer significant. However, the coefficient estimate for the presence of an overconfident CEO-director is positive and significant at the 1% level.

Table 2.10: Overconfidence and Net Debt Issues

This table provides the effects of overconfidence on net net debt issues, defined as long-term debt issues less long-term debt reduction, scaled by total assets. All variables are defined in the Appendix. All controls are lagged. Standard errors in brackets are robust to heteroskedasticity and clustered by firm. All models include year and industry dummies. Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

	Model 1	Model 2	Model 3
OC CEO	0.002		-0.049**
	[0.004]		[0.025]
OC Board		-0.003**	-0.004***
		[0.001]	[0.001]
OC CEO * OC Board			0.055**
			[0.025]
Vested Options	-0.000**	0	0
	[0.000]	[0.000]	[0.000]
Stock Ownership	-0.003	-0.006	-0.005
	[0.009]	[0.009]	[0.009]
Book Leverage	0.008***	0.008***	0.008***
	[0.003]	[0.003]	[0.003]
OC CEO * NFD	0.061	0.063	0.063
	[0.050]	[0.050]	[0.052]
Vested * NFD	-0.000***	-0.000***	-0.000***
	[0.000]	[0.000]	[0.000]
Leverage * NFD	0.004	0.004	0.004
	[0.003]	[0.003]	[0.003]
Ownership * NFD	0.048	0.047	0.048
	[0.040]	[0.039]	[0.040]
Constant	0.027**	0.027**	0.027**
	[0.013]	[0.013]	[0.013]
Observations	20380	20380	20380
R^2	0.031	0.031	0.032

Table 2.11: Overconfidence and Salary

This table provides analysis of the effects of overconfidence on the CEO's salary. All other variables are defined in the appendix. All independent variables are lagged. All models use heteroskedastic-robust standard errors clustered by firm in brackets. All models include year- and industry-fixed effects. Significance is indicated at the 10%, 5%, and 1% level by stars (*,**,***), respectively.

	Model 1	Model 2
CEO Director	17.651**	
	[7.349]	
Non-OC CEO Director		9.052
		[7.723]
OC CEO Director		34.404***
		[9.784]
Insider	12.888	11.622
	[7.861]	[7.797]
CEO Director * Interlocking	-57.591***	-53.966**
	[21.098]	[21.054]
Board Size	8.361***	7.997***
	[2.511]	[2.522]
Size	138.154***	136.945***
	[5.534]	[5.634]
ROA	10.314	11.039
	[24.787]	[24.816]
Stock Return	-0.398**	-0.395**
	[0.190]	[0.190]
Tobin's Q	-3.102	-3.097
	[2.473]	[2.474]
Volatility	-111.852*	-108.635*
	[63.593]	[63.235]
CEO Tenure	3.208***	3.321***
	[0.668]	[0.664]
OC CEO	54.076	41.579
	[34.391]	[34.271]
Constant	-298.668***	-286.926***
	[73.162]	[73.625]
Observations	20380	20380
R^2	0.461	0.462
F-test of Non-OC CEO Director and OC CEO Director		6.27***

the CEO more if a CEO-director sits on the board. Model 2 decomposes CEO-directors into those who are overconfident and those who are not. The coefficient estimate for CEO-director presence is still positive it is no longer significant. However, the coefficient estimate for the presence of an overconfident CEO-director is positive and significant at the 1% level. Moreover, the coefficient estimate is 280% larger than the coefficient estimate for non-overconfident CEO-director presence and an unreported F-Test of the difference in these two coefficient estimates reveals they are statistically different at the 1% level. Thus, while overconfident directors are more active directors, the evidence here suggests they do pay their CEO a larger salary, which is consistent the CEO receiving greater compensation for being subject to more stringent monitoring.

2.7. Conclusion

Prior research has focused on the CEO's overconfidence and firm decisions involving this position and has found overconfident CEOs behave much differently than the average CEO. Because CEOs often serve as directors in other firms, it is important to understand how their overconfidence could potentially affect board decision making. We explore this question by analyzing the overconfident CEO-director's. Specifically, we examine director activity, and we consider the board decision of hiring a new CEO.

At the director level we find evidence that overconfident CEO-directors are more involved on their boards compared to other CEO-directors as indicated through higher board attendance and a significantly greater likelihood of their serving on the nominating committee.

Relatedly, we find strong evidence the director services of overconfident CEO-directors are in greater demand than other CEO-directors as evident by their holding significantly more

directorships. These findings reveal that overconfidence drives directors to be more involved wherever they serve.

At the board level we find overconfident boards are more likely to hire more reputable and overconfident CEO replacements. We also find overconfident boards prefer an inside CEO over an outside CEO. Because directors have more information over insiders relative to outsiders this finding is consistent with overconfident boards maintaining more control over key board decisions such as the selectin of a new CEO.

Finally, we find overconfident boards mitigate the overconfident CEO effect documented in prior literature of using less debt and that overconfident CEO-directors compensate CEOs with a higher salary, which is an extension of the prior research on CEO-directors. Overall, we highlight overconfidence not only affects CEO decisions but board decisions too; thus, overconfidence is another important director trait for shareholders to consider when determining who sits on the board and for researchers to consider in conducting corporate governance analysis and studies of the director labor market.

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APPENDIX

Variable	Definition
Director Level	
Age	Age of a director in years
Attend < 75%	Indicator variable if a director attended less than 75% of the board meetings
Board Tenure	Time in years a director has remained on the board
Independent Directorships	Number of independent outside directorships held by a director
Ownership %	Number of shares owned / common shares outstanding
Audit Membership	Indicator variable if a director is a member of the audit committee
Compensation Membership	Indicator variable if a director is a member of the compensation committee
Nominating Membership	Indicator variable if a director is a member of the nomination committee
Chairman	Indicator variable if a director is Chairman of the board
Female	Indicator variable if a director is Female
Committee Chair	Indicator variable if a director is a Chairman of the audit committee or compensation committee or nomination committee
CEO Tenure	Time in years a director has been the CEO
OC Director	Indicator variable if the Director is labeled overconfident at least once by one of the three overconfidence measures by Malmendier and Tate (2005, 2008)
Busy	Indicator variable if the Director has three or more independent directorships (Fich and Shivdasani (2006))
SOX	Indicator if the year is after 2001 when the Sarbanes-Oxley Act took effect
CEO Director	Indicator variable if the Director is a CEO of a firm elsewhere
% CEO Director	Percentage of board members who are CEOs elsewhere
% Insider	Percentage of board members who are linked to or employed by the firm
% Former CEO Director	Percentage of board members who used to be CEOs at the firm
CEO Director Left	Indicator if a CEO director left in the current year
Board Member Left	Indicator if an independent director left in the current year
Inside Director Left	Indicator if a director who employed by or linked to the firm left in the current year
Other Director Left	Indicator if any other type of director left in the current year

Variable	Definition
Firm Level	
Log (Assets)	Natural log of total assets
Sales	Net sale turnover
Market Cap	Common shares outstanding x fiscal year-end stock price
Leverage	Total assets / stockholder's equity
Number of Segments	Total number of Segments
Tobin's Q	(Market cap + short-term liabilities + long-term liabilities) / (stockholder's equity + short-term liabilities + long-term liabilities)
R&D / Assets	Research and development expense / total assets
Board Size	Total number of Directors on the board
Board Independence %	Percentage of board Directors independent of the firm
CEO Tenure	Length of time in years a director has remained as CEO
Overconfident Board	Indicator variable if at least 1 board Directors is overconfident
Stock Return	(Fiscal end-of-year stock price / Previous fiscal end-of-year stock price) – 1
ROA	Industry-adjusted net income / total assets
Firm Age	Age of the firm according to number of years data has been available in Compustat
% Director Ownership	Percentage of shares the Board of Directors owns of the firm
Service	Indicator if the Fama-French industry code is 7, 11, 33, 34, or 44
Volatility	Standard deviation of monthly stock returns from the previous three years
Manufacturing	Indicator if the Fama-French industry code is 2-5, 8-10, 12-17, 19-26, 35, or 37-40
Herfindahl Index	Sum of squared percentage of industry sales of all industry firms
Homogeneity Index	Mean partial correlation proxy for industry similarity (Parrino 1997)
Capital Expenditures	Capex scaled by assets
Sales Growth	Percentage change in sales from the current year to the previous year
Dividend Payer	Indicates if the firm pays cash dividends
Blockholder	Indicates if an institution owns more than 10% of the company's stock
ACQ / Assets	Cash flow from acquisitions scaled by total assets
Intangible	Amount of intangible assets scaled by total assets
Innovative	Indicator if a firm is an industry with two-digit SIC 10 (metal, mining), 13 (oil & gas extraction), 16 (heavy construction, except building), 25 (furniture and fixtures), 48 (communications), or 50 (wholesale trade – durable goods) from Hirshleifer and Teoh (2011)

CHAPTER THREE

CEO LONG-TERM INCENTIVE PAY IN MERGERS AND ACQUISITIONS

3.1. Introduction

CEO inside debt is a major component of a firm's executive pay package. Companies pay managers fixed sums of cash in the future with financial instruments such as pensions[7]. Accounting for both the debt and equity components of executive compensation in a manner similar to the firm's capital structure was mentioned by Jensen and Meckling (1976), in their analysis of the firm's financing of assets with debt and equity. Since then however, the CEO compensation literature has mainly focused on the equity-based incentives and until recently has not empirically examined CEO debt compensation in the form of deferred compensation and pensions.

The recent empirical (Sundaram and Yermack (2007), Wei and Yermack (2011), and Cassell et al. (2012)) and theoretical (Edmans and Liu (2011)) research finds inside debt incentivizes CEOs to choose less risky investments. This paper expands the literature of executive compensation by analyzing domestic merger and acquisition (M&A) activity and CEO inside debt in the form of deferred compensation payments and pensions. I focus on CEO compensation versus all other employees in this paper since the CEO is most likely to propose and ultimately engage in a large investment such as an M&A (Lehn and Zhao, 2006).

Long-term incentive payouts (LTIP) encompass 60% or more of a median S&P 500 CEO's compensation package. These conditional company shares are distributed in two parts. The CEO

[7] A case study on the compensation of Jack Welch of General Electric is demonstrated by Sundaram and Yermack (2007).

receives half of the shares immediately, followed by the remainder three years later. The CEO receives this portion only if he remains with the company, and the company continues to exist. One of the main differences between deferred equity compensation and pension plans is what occurs in the event of bankruptcy. The CEO receives a percentage of his pension upon company bankruptcy, but the deferred equity compensation value becomes zero since the remaining portion of shares becomes worthless[8].

Wei and Yermack (2011) analyze the market reactions to inside debt and find that after SEC disclosure reform occurred in 2007, firm risk is reduced, and firm value decreases as inside debt becomes substantially large. Cassell et al. (2012) empirically study how CEO inside debt affects investment decisions. They find CEOs with high inside debt choose less risky investments, like capital expenditures rather than R&D, and financial policies.

To gain further insight as to how inside debt can affect CEO investment and financing policy, I analyze the significant investment decisions reflected in domestic M&A[9] transactions from 1996 to 2005 for a total of 17,668 firm-year observations. Specifically, I study the likelihood of making an acquisition along with various aspects of the investment decision such as diversification, payment, and relative deal value to better understand the role of inside debt on the decision-making process of a CEO.

First, I study the likelihood of a CEO engaging in a merger or acquisition. Since debt-based compensation incentivizes the CEO to take less risk (Cassell et al. 2012) and if mergers and

[8] For further information about long-term incentive pay (LTIP), go to investopedia.com, execcomp.org, and wrds-web.wharton.upeen.edu/wrds/.

[9] There are other working papers on this topic. Phan (2012) finds a negative relation between M&A propensity and inside debt as well as less risky merger decisions. Liu, Mauer, and Zhang (2012) find CEOs with inside debt above the optimal level engage in value-destroying diversifying M&A, which brings the inside debt ratio closer to an optimal level. Lin, Officer, and Shen (2013) find CEOs with high inside debt tend overpay in vertical M&A. These papers use data after 2006, whereas this paper focuses on M&A during the last two merger waves and before the financial crisis. Details on the data construction are described in Section 3.

acquisitions tend to be particularly risky (as defined by a higher standard deviation of firm stock returns after the transaction (Roll 1986)), a CEO would be less likely to engage in such an investment the higher is their debt component of compensation. However, if some mergers can reduce the risk of the firm (Agrawal and Mandelker (1987)), then greater CEO inside debt may be associated with more of these types of acquisitions. Consistent with the former I find that the likelihood of a firm to invest via an M&A in a given year and the number of transactions in a given firm-year is significantly and negatively associated with CEO inside debt holdings.

Second, for the firms that do decide to make acquisitions, I study the types of firms are targeted by the acquirer to see if these acquisitions are more likely to be risk reducing ((Agrawal and Mandelker (1987)). Morck, Shleifer, and Vishny (1990) find returns to bidding shareholders are lower when firms diversify, consistent with lowering firm risk. However, diversification can also introduce integration risk (Larsson and Finkelstein (1999) and Hakkinen et al. (2004)). On the other hand, acquisitions within the firm's own industry likely involve lower integration risk given the greater familiarity with their business. Moreover, acquiring a firm within the industry can increase the market share of the combined firm, which reduces competition risk in the future and increases the long-run viability of the firm. An acquisition of this nature will lower the chance of firm bankruptcy and increase the likelihood of the CEO's deferred compensation will be paid in the future. On the other hand, the firm may decide to engage in a diversifying M&A despite the integration risk, because it is only a short-term concern, especially if the firm has more cash available (Harford 1999). I find firms with higher inside debt are less likely to choose a diversifying target firm[10].

[10] Cassell et al. (2012) use an entropy measure of industry segment sales for their diversification measure. I am able to directly test diversification by the type of M&A the acquiring firm chooses to invest.

Third, I study how CEO inside debt impacts the CEO's choice of deal size. Larger targets can help the CEO to increase the overall value of the firm to a point where his future compensation is no longer in jeopardy. However, larger deals can be more risky. Morellec and Zhdanov (2005) find returns to bidders can be negative if there is competition and uncertainty over synergy. I examine the target size using the reported value of the deal according to SDC Platinum and find that as inside debt increases, firms target relatively smaller firms. This is consistent with greater inside debt providing incentives for CEOs to take on safe acquisitions that can be integrated into the firm with little integration risk.

Finally, I examine whether debt in the CEO's compensation structure affects their decision on how to pay for acquisitions. Firms who obtain a controlling position via stock can reduce the debt-to-equity ratio of the firm, which reduces firm risk. Alternatively, acquiring with cash, which is often associated with an increase in debt, can increase bankruptcy risk. Thus, the CEO can be influenced by the inside debt in his/her own compensation and the use of stock is more preferred as the CEOs inside debt compensation increases. Indeed, I find the portion of stock used to pay for the target is positive associated with CEO inside debt.

These findings contribute to the literature in several ways. First, I further extend the literature on the use of CEO inside debt in executive compensation (see Sundaram and Yermack (2007) and Wei and Yermack (2011)). CEO inside debt is becoming a larger portion of compensation, which makes it important to better understand how it incentives CEOs and their risk taking actions. Second, I extend the definition of investing activities outside the scope of R&D and working capital (see Agrawal and Mandelker (1987), Rauh (2006), and Cassell et al. (2012)) by using another type of investment: M&A, which provides additional data and a more in-depth look at specific decisions a CEO can make. Finally, I tie together CEO incentives in M&A (see

Harford (2004) and Lehn and Zhao (2006)) by using CEO inside debt versus stock (see Core and Guay, 1999). The relative proportion of stock options and inside debt used to pay the CEO will affect his incentives and decision-making on important M&A decisions.

This paper differs from Cassell et al. (2012) in several ways. I analyze M&A, an investment whose riskiness is circumstantial. This provides more detail concerning specific decisions regarding an investment than analyzing accounting variables and their respective associations and correlations with inside debt. The data I use are during the period before the financial crisis and encompass two merger waves. During the financial crisis many companies invested little due to a lack of opportunities. Moreover, our measures of inside debt differ. I specifically look at the inside debt vehicle of deferred compensation with respect to equity received from long-term incentive plans, whereas Cassell et al. (2012) and Phan (2013) study the combination of deferred compensation from bonuses, pension plans, and expected future cash compensation, which is available after 2006. In addition, unlike Cassell et al. (2012), I also investigate the types of decisions made with an M&A. While Phan (2013) also studies M&A, the sample period is mostly during the financial crisis. During the financial crisis, acquisitions were either very successful or led to company failure, creating a survivorship bias both during and post-financial crisis. Since my sample stops in 2005 and the sample in Phan (2013) includes the financial crisis period, a structural break exists between the time periods of interest in our papers.

The paper is organized as follows. Section 2 provides an extensive review of the literature and generates testable hypotheses. Section 3 explains the dataset and methodology. Section 4 discusses the empirical results. Section 5 provides further exploration of risk, robustness, and returns. Section 6 concludes. The appendix contains a reference guide of descriptions for the variables used in this paper.

3.2. Literature Review and Hypothesis Development

The literature on executive compensation has largely concentrated on equity holdings. Pay-for-performance incentives align managerial interests with shareholders (Jensen and Murphy (1990), Mehran (1995)). However, in recent years, the literature has expanded to include CEO debt holdings, such as deferred compensation and pensions, otherwise known as inside debt. Edmans and Liu (2010) point out that a CEO compensation scheme contains both equity and debt and therefore it is important to recognize the incentives arising from the debt component of their compensation. Consequently, a manager's personal leverage, defined as debt over equity holdings, can greatly affect firm risk. For example, empirically, Rauh (2006) finds firms with large defined benefit pension obligations are constrained and choose to invest less due to this extensive debt burden. The resulting reduction in investments implies the firm has fewer opportunities to fail; thus, firm risk is reduced.

Cassell et al. (2012) expands the literature by focusing on CEO decisions concerning investments and financing. They find that large debt holdings by the CEO will lead him to reduce firm risk for two reasons. First, if the CEO's inside debt is greater than the CEO's equity holdings, the CEO has a reduced incentive to increase wealth via stocks and stock options. Since the CEO can increase stock value by taking on higher risk in order to reap higher returns, when inside debt is greater than the equity incentives, the CEO has incentive to reduce risk rather than increase it. Second, increasing deferred compensation increases the incentive for the CEO to make decisions which will make the firm last after his retirement or departure in order for him to be fully compensated in later periods. Thus, the CEO will make decisions to reduce the likelihood of bankruptcy and to increase the long-run viability of the firm. Consistent with this, Cassell et al. (2012) find increases in CEO inside debt reduce stock return volatility, a measure of firm risk.

Mergers and Acquisitions represent a specific firm investment that can be risk increasing[11] (Roll 1986). If greater inside debt predisposes a CEO to avoid risky firm investments, then the CEO can view the M&A as too risky, despite the potential of it yielding positive NPV.

Hypothesis 1a: CEO inside debt holdings are negatively associated with the likelihood of an M&A.

Another risk-based explanation for an M&A decision is the co-insurance effect, where one combined firm is better than two separate entities in the eyes of bondholders who are concerned with default. Levy and Sarnat (1970) find diversification can reduce lender risk and enhance firm value through reduced financing costs of the new conglomerate. Lewellen (1971) finds conglomeration may occur if market undervaluation or a sub-optimal capital structure exists. Overall firm value is enhanced if additional borrowing capacity is created. Higgins and Schall (1975) find tax incentives allow the increase in debt value following a merger to counteract the decrease in equity value; thus, the net effect on firm value is positive. Finally, Agrawal and Mandelker (1987) find evidence that M&A events are risk reducing when the ratio of executive stock and options to total compensation is lower. Thus, if these factors dominate CEO decision making then we have the following hypothesis.

Hypothesis 1b: CEO inside debt holdings are positively associated with the likelihood of an M&A.

Cassell et al. (2012) examine specific investment and financing decisions and find increasing inside debt reduces the more risky R&D investment and increases the less risky capital expenditures. Similarly, CEOs that do engage in M&A can choose acquisitions that are less risky. One way CEOs can reduce risk is by diversification (i.e. operate in different industries). For

[11] See Agrawal, Jaffe, and Mandelker (1992), Anderson and Mandelker (1993), Asquith (1983), Langetieg (1978), Loughran and Vijh (1997), Malatesta (1983), and Mitchell and Stafford (1998).

example, suppose a firm is undiversified. If the firm product fails in the market, this leads to the ultimate collapse and bankruptcy of the firm. Now suppose a firm is diversified in multiple markets. If one product fails, the losses sustained by one industry will be mitigated by other markets breaking even or generating profits. Thus, diversification is negatively associated with bankruptcy exposure. Indeed, Cassell et al. (2012) find increasing inside debt subsequently leads to higher diversification as measured by the entropy of sales. In addition, they also find that firms with higher inside debt tend to increase working capital and decrease financial leverage. In terms of M&A decisions, Harford (1999) finds firms with more cash are more likely to attempt a diversifying M&A and Liu et al. (2013) finds a positive relationship between inside debt and cash holdings. Thus, one proposition is CEOs with high levels of inside debt have incentives to engage in a diversifying M&A.

Hypothesis 2a: When firms with increasing levels of CEO inside debt decide to engage in an acquisition, those acquisitions are more likely to be diversifying.

Alternatively, the CEO of acquiring firms can target similar firms in the same industry with the intention to reduce risk by reducing market competition or to further enhance the company's current operations. Morck, Shleifer, and Vishny (1990) find returns to bidding shareholders are lower when firms diversify due to the reduction in risk. Firms deciding to branch out into other industries take on integration risk and increase the risk of potential failure if the venture does not work well with the current synergies of the firm. Conversely, future firm performance as measured by stock returns is higher for firms who have a within-industry acquisition (Uysal 2011). Thus, the CEO will choose targets that can be more easily integrated and that can enhance the current operations of the company in the context of the acquiring firm's current industry. This will lower

the chance of firm bankruptcy and increase the likelihood his deferred compensation will be paid in the future.

Hypothesis 2b: When firms with increasing levels of CEO inside debt decide to engage in an acquisition, those acquisitions are less likely to be diversifying.

Liquidity in the form of cash needs to be readily available for firms, especially for those with large debt obligations in the form of deferred compensation and pensions for executives. Thus, paying with cash or incurring additional debt to acquire a target is less attractive for CEOs with high inside debt and thus they likely prefer to acquire with stock in order to reduce the debt-to-equity ratio of the firm. This is an additional incentive for stock acquisitions beyond the stock being undervalued relative to the bidder (Shleifer and Vishny, 2003). Not incurring debt and acquiring with stock provides the firm with more liquidity and a potentially better credit rating, which reduces bankruptcy risk.

Hypothesis 3: The acquisition payment in stock increases as CEO inside debt increases.

Finally, the target firm size is also related to integration risk as smaller firms are easier to integrate than are larger firms. This immediate short-term risk may drive CEOs to choose a smaller target so as to not jeopardize the livelihood of the firm, since acquiring a larger firm can lead to long-run sustainability concerns if integration fails.

Hypothesis 4: CEO inside debt is negatively associated with relative acquiring deal values.

3.3. Data and Methodology

Executive compensation is obtained from Execucomp[12]. The data is screened for only CEOs using the ceoann variable. Company financials are from the CRSP/Compustat merged

[12] The security of the CEO debt (i.e. is the pension funded or guaranteed) is not considered here. This may affect the CEO's riskiness if the debt is guaranteed, irrespective of the firm's future existence. If this were the case, it would be easier to take greater risk on the equity side. This would increase instead of mitigate the agency cost of debt, which is one reason to defer compensation. Secured debt would bias against my finding significant results.

database provided by WRDS. Merger and acquisition data are from Thomson Reuters SDC Platinum. Governance and board controls are from Risk Metrics. The following restrictions minimize the dataset. The transactions are domestic (U.S.) only. The announcement date must occur between 1996 and 2005. The acquirer must have public status. The deal must be completed and unconditional. The percent of shares owned before (after) the transaction must be less than (equal to) 50% (100%). The percent of shares the acquirer seeks to own must be equal to 100%. The deal value must be greater than 10 million. Two-digit SIC codes 49 (utilities) and 60-67 (financial firms) are excluded due to government regulation restrictions. The final sample results in 17,668 firm-year observations with 3,872 merger or acquisition transactions.

I test the theory of Edmans and Liu (2011), who argue inside debt increases lead to conservative decisions, and build on the hypothesis of Jensen and Meckling (1976) that firms should finance the CEO in the same manner as the firm in order to properly align incentives and reduce agency costs. The main independent variables of interest are the log of CEO to firm debt/equity ratio (CEO RDE) and the log of CEO relative incentive ratio (CEO RIR). In theory, both CEO RDE and CEO RIR would be optimal at one. CEO RDE is the ratio of the CEO's inside debt to the firm's debt, where the CEO has debt in the form of pension benefits and deferred compensation and equity in the form of stock and stock options (valued by Black-Scholes (1973)), and the firm has current and long-term debt and equity valued by the market. This is equal to [(CEO IDH / CEO EH)/(FD / FE)], where CEO IDH is the aggregated present value of pension benefits and deferred compensation, CEO EH is the value of stock (fiscal year-end stock price multiplied by the number of shares held (including restricted)) and stock options (Black-Scholes valuation of the newly granted, exercisable, and unexercisable tranches), FD is total current

liabilities and long-term debt[13], and FE is the current number of shares outstanding multiplied by the fiscal-year end stock price. The formula is:

$$\frac{\dfrac{ltip}{shrown_{excl_{opts}} * prccf + (opt_{exer_{val}} + opt_{unex_{exer_{est_{val}}}} + opt_{unex_{unexer_{est_{val}}}})}}{\dfrac{dltt + dlc}{csho * prccf}} \tag{1}$$

CEO RIR is the ratio of the CEO relative incentive ratio established by Wei and Yermack (2011), where the CEO has debt in the form of pension benefits and deferred compensation and equity in the form of stock and stock options (valued according to option delta by exercisability tranches by Black-Scholes (1973) as defined below) and the firm has current liabilities and long-term debt and equity options (valued by total employee options, the average outstanding exercise price, and assumed expiration of 4 years).

$$Option\ Value = Se^{-dT}N(Z) - Xe^{-rt}N\left(Z - \sigma T^{\frac{1}{2}}\right) \tag{2}$$

$$Z = \frac{\ln\left(\frac{S}{X}\right) + T(r - d + \frac{\sigma^2}{2})}{\sigma T^{\frac{1}{2}}} \tag{3}$$

where N is the cumulative normal distribution function, S is the underlying stock price, X is the option exercise price, σ is the expected stock-return volatility over the option life, r is the natural logarithm of the risk-free rate, T is the time-to-maturity in years, and d is the natural logarithm of the dividend yield. I follow Core and Guay (2002) in estimating T and X. Unexercised unexercisable (exercisable) options have T-1 (T-3) fewer years than previously granted options. If no options are granted in the previous year than T=9 (T=6) for unexercisable (exercisable) options. The exercise price is calculated as the difference between the end-of-year stock price and the

[13] Some firms do not have debt (see Agrawal and Nagarajan (1990)). I initialize such cases to zero. This is not an issue for equity since our sample contains public firms in the S&P 1500.

average value (i.e. realizable value of previously granted options divided by the number of options unexercised). The formula for CEO RIR is:

$$\frac{ltip}{\frac{shrown_{excl_{opts}} * prccf + \sum_1^3 delta_i * \ option\ type_i}{\frac{dltt + dlc}{optosey * optprcby}}} \tag{4}$$

I use several controls for both the CEO and the firm. Morse, Nanda, and Seru (2010) find powerful CEOs rig their incentive contracts. Malmendier, Tate, and Yan (2011) find CEO attributes and types of compensation affect the financial decisions they make. Thus, CEO controls are essential to the executive compensation analysis. Control variables specific to the CEO include age, a gender indicator if the CEO is male, an indicator if the CEO was the Chairman of the Board, the length of tenure the CEO has with the current firm, and the percent of shares the CEO owns (excluding options) relative to the entire market.

Carlson and Lazrak (2010) find a positive association between manager's pay sensitivity in the form of cash to stock and the firm's leverage ratios. Harford and Li (2007) find CEO wealth becomes insensitive to poor performance after a merger if board governance is weak. Control variables specific to the firm include a measure of size via the natural logarithm of assets, leverage defined as total firm debt scaled by total firm assets, contemporaneous and the lag of total shareholder return (including dividends), the G-index as a measure of governance (Gompers, Ishii, and Metrick (2003)), the age of the firm according to its IPO date, the board size, and the percentage of board members classified as independent from the firm[14]. I use Fama- French 48

[14] CEOs can set up their compensation packages. Conservative CEOs may select conservative packages including high amounts of deferred compensation for their future consumption. However, after SOX in 2002, the oversight committee for a CEO's compensation must have independent directors, and the CEO is not allowed to be on the compensation committee. Firms listed on securities exchanges, such as NYSE and NASDAQ, must meet this requirement. See http://nasdaq.cchwallstreet.com/NASDAQ/Main/ for further information.

industry classifications from Kenneth French's website[15] and year fixed effects to account for industry differences in valuation dispersion and merger waves (Shleifer and Vishny, 2003).

Finally, merger variables include the value of the deal completed between the acquirer and target, the percentages of stock and cash used in the transaction, an indicator if the transaction is a merger of equals, an indicator if the target firm is private, public, or a subsidiary, interactions among public status and if the deal was completed completely in cash, an indicator if there were multiple bidders, an indicator if the target firm has defensive provisions, an indicator if a tender offer is made, and an indicator if the M&A was unsolicited . The summary statistics are provided in Table 3.1.

Panel A describes the whole sample of 17,668 firm-year observations. CEO RDE averages –2.721, which is higher than the CEO RIR mean of –7.499. The means of the variables of interest are lower than the values reported in Cassell et al. (2012) due to variable calculations over several market highs and lows versus the market's record high in 2006 used by Cassell et al. Firm reporting requirements for inside CEO debt did not become fully regulated until after the defined benefit crisis in 2003[16] and the SEC disclosure requirement came into effect in 2007[17]. There are slightly fewer observations for the CEO RIR since the calculation requires more data to calculate the option value using CEO delta. The average CEO age is 56 years old, with the youngest in the sample at 32 and the oldest at 91 years. 98.5% of the CEOs in our sample are male. 67% of CEOs also serve as Chairman of the Board. The mean and median firm tenure of the CEO is 8 and 7 years, respectively. The average CEO owns 3% of the company's total shares (excluding options).

[15] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[16] One of the major firms involved was United Airlines. The firm's bankruptcy quickly eroded defined benefit plan values of most employees. The U.S. Senate used this occurrence to have a hearing and begin the process of regulation. See http://www.finance.senate.gov/library/hearings/.

[17] Regulation S-K states how companies report pension valuations. See http://www.sec.gov/divisions/corpfin/guidance/execcomp402interp.htm.

Table 3.1 Summary Statistics

This table provides summary statistics on 17,668 firm-year observations, including 3,872 merger transactions from 1996 to 2005. Variable descriptions are described in the appendix. Panel A describes the full sample of firms, including those who did not have a merger transaction. Panel B describes the full sample of firms who had mergers. Panel C compares the merger sample by comparing firms with a CEO RDE ratio greater than zero and firms with a CEO RDE ratio less than zero. Median statistics are results from the Mann-Whitney (1947) test (i.e. Wilcoxon rank-sumtest) of two independent unmatched samples from populations who come from the same distribution.

Panel A: Full Sample

Variable	N	Mean	Std Dev	Minimum	Median	Maximum
Variables of Interest						
CEO RDE	17668	-2.721	2.330	-20.008	-2.849	11.854
CEO RIR	10696	-7.499	4.961	-31.914	-7.858	22.131
CEO Controls						
Age	17241	56.224	7.188	32	56	91
Gender	17668	0.985	0.121	0	1	1
Chairman	17668	0.669	0.470	0	1	1
CEO Tenure	17668	7.729	7.047	0	6	61
CEO Ownership	17668	0.029	0.125	0	0.011	12.955
Firm Controls						
Assets	17668	7357.64	21559.05	16.767	1783.13	697239
Leverage	17668	0.419	3.372	-73.171	0.357	253.307
Return_t	17537	16.195	58.135	-97.672	9.491	1304.094
Return_{t-1}	17496	18.411	55.587	-94.009	12.993	1304.094
G-index	17401	9.514	2.637	2	10	18
Firm Age	17668	11.243	4.933	0	11	38
Board Size	17668	9.693	2.559	3	9	26
Board Independence	17641	65.432	17.190	7.692	66.667	100

Panel B: Merger Sample

Variable	N	Mean	Std Dev	Minimum	Median	Maximum
Variables of Interest						
CEO RDE	3872	-2.834	2.243	-19.589	-2.947	6.625
CEO RIR	2352	-7.525	4.845	-19.908	-8.273	22.131
CEO Controls						
Age	4151	55.805	7.165	34	56	84
Gender	4229	0.986	0.118	0	1	1
Chairman	4229	0.663	0.473	0	1	1
CEO Tenure	4229	8.019	6.983	0	7	46
CEO Ownership	4229	0.028	0.206	0	0.01	12.955
Firm Controls						
Assets	4213	8865.683	22494.47	49.904	2393.12	437006
Leverage	4229	0.335	0.255	0	0.34	4.893
Return_t	4213	20.126	68.313	-97.672	11.888	1304.094
Return_{t-1}	4206	26.315	65.159	-89.572	19.760	1772.631
G-index	4163	9.507	2.701	2	9	18
Firm Age	4229	11.269	4.931	0	11	36
Board Size	4229	9.638	2.551	4	10	26
Board Independence	4219	66.141	16.732	9.091	66.667	92.857
Merger Variables						
Deal Value	4219	670.799	3327.673	10	114.942	89167.72
Of Stock	1244	77.152	28.582	1.84	94.505	100
Merger of Equals	4229	0.001	0.034	0	0	1
Private	4229	0.356	0.479	0	0	1
Public	4229	0.272	0.445	0	0	1
Subsidiary	4219	0.368	0.482	0	0	1
Of Cash	2241	86.156	25.289	0	100	100
Number of Bidders	4229	0.019	0.136	0	0	1
Defensive Provisions	4229	0.040	0.194	0	0	1

Tender Offer	4229	0.080	0.271	0	0	1
Hostile	4229	0.019	0.135	0	0	1
Public * Cash	4229	0.085	0.278	0	0	1
Public * Stock	4229	0.073	0.260	0	0	1
Private * Cash	4229	0.118	0.323	0	0	1
Private * Stock	4229	0.060	0.238	0	0	1
Subsidiary * Cash	4229	0.154	0.361	0	0	1

Panel C: Inside Debt Levels of Full Sample

	CEO RDE > 1			CEO RDE < 1						
Variable	N	Mean	Median	N	Mean	Median	Mean Dif	T-Stat	Med Dif	Z-Stat
Variables of Interest										
CEO RDE	1743	1.506	1.052	15925	-3.183	-3.086	-4.716	-91.522***	-4.689	-62.775***
CEO RIR	827	-2.633	-2.924	9869	-7.907	-8.205	-5.811	-29.359***	-5.274	-27.520***
CEO Controls										
Age	1658	54.619	55	15583	56.395	57	2.326	11.415***	2	11.369***
Gender	1743	0.979	1	15925	0.986	1	0.008	2.363**	0	2.363**
Chairman	1743	0.571	1	15925	0.680	1	0.130	10.051***	0	10.021***
CEO Tenure	1743	6.243	5	15925	7.948	6	1.802	9.311***	1	9.846***
CEO Ownership	1743	0.016	0.005	15925	0.031	0.011	0.015	4.263***	0.010	18.079***
Firm Controls										
Assets	1743	4712.296	1021.657	15925	7647.175	1911.83	4356.967	7.602***	890.173	20.934****
Leverage	1743	0.145	0.025	15925	0.449	0.38	0.333	3.486***	0.355	47.879***
$Return_t$	1730	15.239	11.523	15801	16.300	9.290	0.943	0.574	-2.233	0.188
$Return_{t-1}$	1722	25.818	14.684	15774	17.603	12.820	-10.700	-6.780***	-1.864	-3.826***
G-index	1724	9.112	9	15677	9.558	10	0.557	7.614***	1	7.697***
Firm Age	1743	11.703	12	15925	11.192	11	-0.092	-0.677	-1	0.009
Board Size	1743	8.858	9	15925	9.773	10	1.117	15.800***	1	16.720***
Board Independence	1743	66.951	66.667	15898	65.266	66.667	-0.308	-0.645	0	0.548

Panel D: Inside Debt Levels of Merger Sample

	CEO RDE > 1			CEO RDE < 1						
Variable	N	Mean	Median	N	Mean	Median	Mean Dif	T-Stat	Med Dif	Z-Stat
Variables of Interest										
CEO RDE	345	1.590	1.208	3527	-3.256	-3.189	-4.913	-44.765***	-4.397	-27.899***
CEO RIR	149	-3.931	-4.504	2213	-7.751	-8.639	-3.837	-7.447***	-3.247	-8.115***
CEO Controls										
Age	330	53.545	53.500	3471	56.344	56	3.276	7.262***	2.5	7.894***
Gender	345	0.994	1	3527	0.985	1	-0.015	-2.049**	0	-2.048**
Chairman	345	0.565	1	3527	0.688	1	0.143	4.953***	0	4.937***
CEO Tenure	345	6.371	6	3527	8.212	7	1.916	4.414***	1	4.110***
CEO Ownership	345	0.012	0.004	3527	0.03	0.011	0.017	1.268	0.013	8.602***
Firm Controls										
Assets	345	6901.98	2092.187	3527	9640.868	2850.500	4721.872	3.233***	758.313	7.432***
Leverage	345	0.127	0.015	3527	0.388	0.378	0.291	20.038***	0.363	21.257***
$Return_t$	345	7.302	5.059	3527	20.806	12.599	14.824	3.472***	7.540	3.722***
$Return_{t-1}$	343	27.332	22.386	3506	24.790	19.678	-6.396	-1.870*	-2.708	-2.660**
G-index	344	9.070	9	3467	9.692	10	0.740	4.401***	1	4.690***
Firm Age	345	12.829	13	3527	11.120	11	-1.286	-4.214***	-2	-3.504***
Board Size	345	9.252	9	3527	9.892	10	0.843	5.381***	1	6.300***
Board Independence	345	67.110	66.667	3517	66.122	69.231	0.601	0.573	2.564	0.968
Merger Variables										
Deal Value	345	1234.125	80.000	3527	640.886	121.637	0.037	1.337	41.637	1.690*
Of Stock	345	24.677	0	3527	21.647	0	-7.684	-3.231***	0	-2.892***
Merger of Equals	345	0.003	0	3527	0.001	0	0.001	0.498	0	0.498
Private	345	0.443	0	3527	0.334	0	-0.164	-5.605***	0	-5.582***
Public	345	0.264	0	3527	0.276	0	0.027	0.977	0	0.977
Subsidiary	345	0.293	0	3527	0.386	0	0.133	4.422***	0	4.412***
Of Cash	345	53.048	77.780	3527	44.862	22.680	-3.144	-1.086	-55.100	-0.947
Number of Bidders	345	0.029	0	3527	0.018	0	-0.014	-1.612	0	-1.611
Defensive Provisions	345	0.017	0	3527	0.039	0	0.020	1.622*	0	1.621*

Tender Offer	345	0.093	0	3527	0.081	0	-0.009	-0.514	0	0.607
Hostile	345	0.014	0	3527	0.019	0	0.002	0.226	0	0.226
Public * Cash	345	0.130	0	3527	0.083	0	-0.022	-1.260	0	-1.260
Public * Stock	345	0.061	0	3527	0.070	0	-0.003	0.178	0	0.178
Private * Cash	345	0.148	0	3527	0.110	0	-0.043	-2.190**	0	-2.189**
Private * Stock	345	0.136	0	3527	0.048	0	-0.117	-8.117***	0	-8.046***
Subsidiary * Cash	345	0.168	0	3527	0.157	0	-0.009	-0.403	0	0.403

The average firm has assets of $7.4 billion, a leverage ratio of 0.42, a G-index of 9.5, firm age of 11 years, 10 members on the Board of Directors, and 65.5% of the board members are independent from the firm.

Panel B describes the sample of 3,872 mergers and acquisitions. The average age for the acquiring CEO is 56 years old, and 98.6% are male. They serve as Chairman 66.3% of the time, have tenure of 8 years, and own 2.8% of total firm shares (excluding options). The average firm has $8.9 billion in assets, a leverage ratio of 0.34, a G-index of 9.5, and an average firm age of 11. The Board of Directors averages 10 members, 66.2% of whom are independent from the firm. The average merger has a value of $671 million with 22.7% of the purchase being completed with stock. There are only 7 transactions classified as a merger of equals, and 35.6% of the target firms are classified as private. Comparing Panels A and B, I find the merger sample has (on average) lower inside debt. The acquiring firm is larger in size according to its assets and has less contemporaneous return.

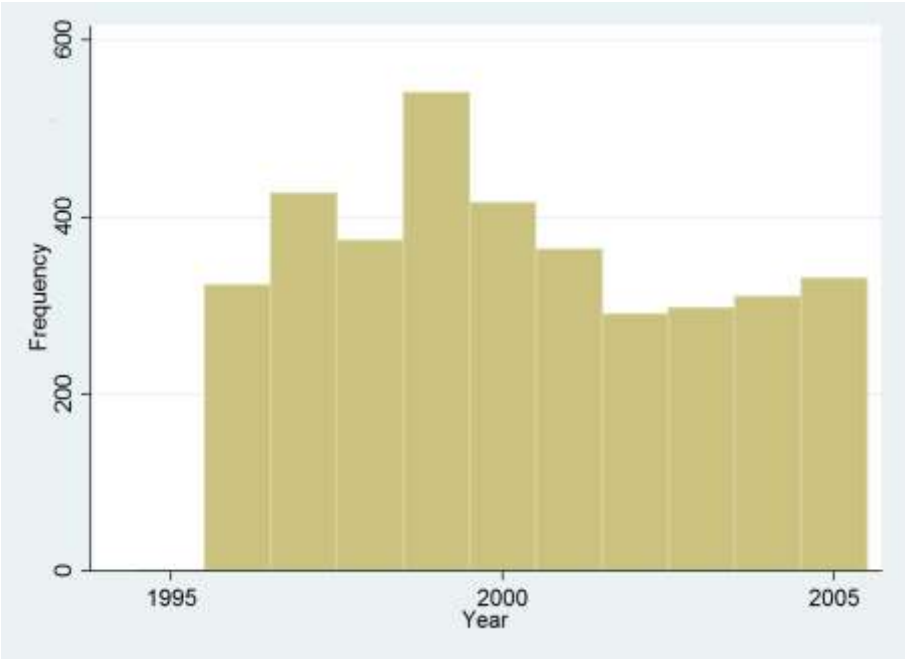
Figure 1 provides a breakdown of the number of mergers per year in the sample. This histogram breaks down the frequency of the 3,872 merger transactions by year from 1996 to 2005. Merger wave peaks occurred for this sample in 1997 and 1999. Merger wave troughs occurred in 1996 and 2002. The fewest number of mergers occurred in 2002. The most happened in 1999. The average number of mergers per year from 1996 to 2005 is 387.

Panel C of Table 3.1 provides further analysis of inside debt levels[18]. The full sample is split between CEO RDE > 1 and CEO RDE < 1. The means and medians for each sample are calculated and then tested to see if the differences are significant. Ten percent of the full sample

[18] 52 firms are excluded in Panel C since the value for their variables of interest is zero.

Figure 3.1: Number of Mergers by Year

This histogram breaks down the frequency of the 3,872 merger transactions by year from 1996 to 2005. Merger wave peaks occurred for this sample in 1997 and 1999. Merger wave troughs occurred in 1996 and 2002. The fewest number of mergers occurred in 2002. The most happened in 1999. The average number of mergers per year from 1996 to 2005 is 387.



has high inside CEO debt. High inside debt firms have a CEO who is younger, less likely to be male, less likely to be Chairman, has less tenure, and owns less company stock. Higher inside debt firms have fewer assets, less leverage[19], a smaller G-index, and smaller board size. The T-Statistics for the differences in the sample means is highly significant for all variables except contemporaneous return. The Z-Statistics for the differences in the sample medians using the Mann-Whitney (1947) statistic are significant for all variables where the T-statistics were significant.

Panel D of Table 3.1 provides a breakdown of acquirers who have a high amount of CEO inside debt versus those with a low amount. The results are similar to Panel C. Contemporaneous

[19] This may be due to a mechanical relationship between inside debt and leverage.

return is higher for firms with lower levels of inside debt. With respect to the merger variables, high inside debt firms have higher deal values, are more likely to engage in private or subsidiary deals, use more cash, and have fewer defensive provisions.

3.4. Empirical Results

I begin by analyzing the association between inside debt and the probability of an M&A. Table 3.2 analyzes the likelihood of a merger in the presence of inside debt. All analyses calculate standard errors with a robust heteroskedasticity covariance matrix and firm clustering. In each panel, I report models using both measures of CEO inside debt first with only CEO controls, second with only firm controls and then third both CEO and firm controls. Panel A contains logistic regressions of the full sample, where the dependent variable is an indicator if a merger occurred in the year. CEO RDE has a consistent and statistically negative coefficient in all models, which means higher CEO inside debt is associated with a lower probability of the firm initiating an acquisition. CEO RDE goes from -0.043 with only firm controls to -0.052 in the models with CEO controls only and both CEO and firm controls, respectively. CEO RIR is negative but statistically insignificant in all models. CEO RIR goes from -0.012 with only CEO controls to -0.004 with only firm controls to -0.008 with both firm and CEO controls. The coefficient on Model 5 is interpreted as a 1% increase in the standard deviation of the log of CEO RDE decreases the M&A propensity by 12.5%. Other controls indicate larger firms tend to acquire or merge less often than smaller size firms. Firms with higher shareholder returns in the current or previous year are more likely to acquire. Firms with more independent boards are more likely to engage in an M&A. In the full model with CEO RDE, 8% of the variation is explained with the model.

Table 3.2: Merger Likelihood Association with CEO Inside Debt

This table provides analysis on the likelihood of a merger given the presence of CEO inside debt. Panel A provides logistic regression analysis. The dependent variable is an indicator if a merger transaction occurred with the firm in a given year. Panel B provides Poisson regression analysis of the full sample. Panel C provides Poisson regression analysis of the merger sample. The dependent variable in Panels B and C is a count of mergers by the firm over the sample period from 1996 to 2005. See the appendix for variable definitions. Industry controls are also provided using the Fama-French 48 industry classifications. Year fixed effects are included in all models. All errors in brackets are clustered by firm. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

Panel A: Logistic Models of Merger Likelihood

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables of Interest						
CEO RDE	-0.054***		-0.043**		-0.052**	
	[0.021]		[0.021]		[0.024]	
CEO RIR		-0.012		-0.004		-0.008
		[0.013]		[0.013]		[0.014]
CEO Controls						
Age	-0.002	0.008			-0.004	0.007
	[0.007]	[0.009]			[0.008]	[0.010]
Gender	0.042	0.054			0.081	0.049
	[0.224]	[0.269]			[0.231]	[0.292]
Chairman	0.043	-0.074			-0.152	-0.25
	[0.112]	[0.150]			[0.113]	[0.164]
CEO Tenure	0.004	0.005			0.007	0.009
	[0.005]	[0.006]			[0.005]	[0.006]
CEO Ownership	-0.407	-1.552			-0.092	-0.66
	[1.056]	[1.149]			[0.343]	[0.638]
Firm Controls						
Log (Assets)			0.309***	0.317***	0.320***	0.329***
			[0.041]	[0.054]	[0.040]	[0.050]
$Leverage_{t-1}$			-0.806***	-1.000***	-0.798**	-1.010***
			[0.311]	[0.289]	[0.323]	[0.290]
$Return_t$			0.001	0	0.001	0
			[0.001]	[0.001]	[0.001]	[0.002]
$Return_{t-1}$			0.002***	0.006***	0.002***	0.006***
			[0.001]	[0.001]	[0.001]	[0.001]
G-Index			0.019	0.033*	0.023	0.034*
			[0.015]	[0.019]	[0.015]	[0.020]
Firm Age			-0.001	-0.002	-0.002	-0.005
			[0.009]	[0.010]	[0.009]	[0.011]
Board Size			-0.037*	-0.037	-0.038*	-0.045
			[0.021]	[0.028]	[0.022]	[0.027]
Board Independence			0.001	0	0.001	0.001
			[0.003]	[0.004]	[0.003]	[0.004]
Constant	-1.864***	-0.983	-3.485***	-2.184***	-3.416***	-2.551**
	[0.671]	[1.058]	[0.566]	[0.816]	[0.717]	[1.106]
Pseudo R^2	0.04	0.05	0.06	0.08	0.07	0.08
Observations	16252	9882	16178	9857	15798	9665

Panel B: Poisson Models of Merger Count from Full Sample

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables of Interest						
CEO RDE	-0.045***		-0.022		-0.025*	
	[0.015]		[0.014]		[0.015]	
CEO RIR		-0.007		0.004		0.001
		[0.009]		[0.009]		[0.010]
CEO Controls						
Age	0	0.008			-0.002	0.006
	[0.005]	[0.007]			[0.005]	[0.007]
Gender	0.059	0.039			0.154	0.123
	[0.170]	[0.189]			[0.182]	[0.216]
Chairman	0.038	-0.059			-0.088	-0.18
	[0.083]	[0.108]			[0.084]	[0.114]
CEO Tenure	0.005	0.004			0.007**	0.006
	[0.004]	[0.005]			[0.003]	[0.005]
CEO Ownership	-0.302	-1.169			-0.022	-0.398
	[0.751]	[0.828]			[0.192]	[0.465]
Firm Controls						
Log (Assets)			0.218***	0.211***	0.225***	0.216***
			[0.028]	[0.038]	[0.028]	[0.036]
$Leverage_{t-1}$			-0.027***	-0.029***	-0.027***	-0.027***
			[0.005]	[0.006]	[0.006]	[0.006]
$Return_t$			0.001	0	0.001	0
			[0.001]	[0.001]	[0.001]	[0.001]
$Return_{t-1}$			0.002***	0.003***	0.002***	0.003***
			[0.000]	[0.001]	[0.000]	[0.001]
G-Index			0.012	0.017	0.015	0.017
			[0.010]	[0.014]	[0.010]	[0.014]
Firm Age			-0.003	-0.002	-0.005	-0.004
			[0.007]	[0.007]	[0.007]	[0.007]
Board Size			-0.031**	-0.023	-0.030*	-0.028
			[0.015]	[0.020]	[0.016]	[0.019]
Board Independence			-0.001	-0.001	-0.001	-0.001
			[0.002]	[0.003]	[0.002]	[0.003]
Constant	-2.107***	-1.379*	-3.159***	-2.118***	-3.258***	-2.570***
	[0.519]	[0.744]	[0.455]	[0.517]	[0.545]	[0.739]
Pseudo R^2	0.03	0.03	0.05	0.05	0.05	0.05
Observations	16318	9949	16243	9923	15863	9731

Panel C: Poisson Models of Merger Count from Merger Sample

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables of Interest						
CEO RDE	-0.007**		-0.006***		-0.004**	
	[0.003]		[0.002]		[0.002]	
CEO RIR		0.001		0		0
		[0.001]		[0.001]		[0.001]
CEO Controls						
Age	0.002*	0.002			0.002*	0.001
	[0.001]	[0.001]			[0.001]	[0.001]
Gender	0.032*	0.001			0.029	0.005
	[0.019]	[0.005]			[0.019]	[0.009]
Chairman	0.001	-0.008			0.007	0.001
	[0.009]	[0.010]			[0.007]	[0.008]
CEO Tenure	0.002*	0			0.001*	0
	[0.001]	[0.001]			[0.001]	[0.001]
CEO Ownership	-0.001	0.103			0	0.053
	[0.005]	[0.100]			[0.005]	[0.076]
Firm Controls						
Log (Assets)			0.001	-0.009	0.001	-0.008*
			[0.004]	[0.005]	[0.004]	[0.005]
$Leverage_{t-1}$			0	0.001	0	0.001
			[0.000]	[0.001]	[0.000]	[0.001]
$Return_t$			0.001**	0.000*	0.001**	0.000*
			[0.000]	[0.000]	[0.000]	[0.000]
$Return_{t-1}$			0	0	0	0
			[0.000]	[0.000]	[0.000]	[0.000]
G-Index			0	-0.004**	0	-0.004**
			[0.002]	[0.002]	[0.002]	[0.002]
Firm Age			-0.001	-0.001	-0.002*	-0.001
			[0.001]	[0.001]	[0.001]	[0.001]
Board Size			-0.001	0.004	-0.001	0.004
			[0.003]	[0.002]	[0.002]	[0.002]
Board Independence			-0.001***	-0.001**	-0.001***	-0.001**
			[0.000]	[0.000]	[0.000]	[0.000]
Constant	-0.181**	-0.105	0.04	0.107*	-0.099	-0.008
	[0.090]	[0.088]	[0.039]	[0.057]	[0.079]	[0.091]
Pseudo R^2	0	0	0	0	0	0
Observations	3607	2216	3584	2192	3519	2167

The next two panels analyze the number of acquisitions taking place in a given firm-year in the 11-year period. Panel B displays Poisson regressions using the full sample, where the dependent variable is a count of mergers for the particular firm in a given year. CEO RDE is negative and significant in all models. CEO RIR remains insignificant. I now find larger firms tend to have more mergers than smaller firms. Small firms are less likely to survive as time progresses, either through bankruptcy or becoming a target itself. Lagged leverage is negative and significant, meaning firms with higher leverage tend to have fewer mergers. Lagged return remains positive and significant. Larger boards tend to govern in a manner which reduces the total count of mergers. The full models yield the highest amount of explanatory power with a Pseudo-R^2 of 5%.

Panel C provides an additional robustness check of Panel B using only the merger sample. I find similar results. CEO RDE is negative and significant in all models. Thus, I find merger count declines as inside debt increases in the presence of the other controls. Note the significance of the controls has declined sharply in comparison to Panels A and B. CEO age and tenure are positively associated with M&A count at the 10% level. Size is negative and statistically significant at the 10% level. Firms with higher contemporaneous return, a lower g-index, higher board size, and lower board independence are likely to have more mergers take place over the sample period. The results from this analysis are consistent with H1[20].

The next series of tests analyze specific merger decisions. The dependent variable is an indicator of diversification using two- digit SIC codes. If the acquiring firm and target firm have a

[20] In unreported results, I test the full sample with a zero-inflated Poisson (ZIP) model and find similar results.

different two-digit SIC code, the indicator becomes a one, zero otherwise. Independent variables are inside debt measures and controls pertaining to the CEO, firm, and the merger itself. Table 3.3 presents logistic regressions of diversification.The Pseudo-R^2 of all regressions falls between 13% and 23%. I find CEO RIR is negative and statistically significant at the 1% level for all models, which is consistent with H2b[21]. A one-percent increase in CEO RIR decreases the likelihood of diversification by 6.4%. Thus, firms who pay their CEOs with more inside debt tend to err on the side of synergy versus diversification in improving the firm through M&A investment. Firms with CEOs who have lower tenure and more ownership tend to diversify more. Firms with higher lagged leverage, a higher g-index, and more members on the board tend to choose targets with a different two-digit SIC. Acquirers tend to use less cash for diversifying mergers, and they choose subsidiaries to gain diversification benefits.

The next merger decision involves the proportion of acquisition payment in stock. Table 3.4 analyzes inside debt on the firm's decisions of how to pay for the merger or acquisition using double-sided censored[22] Tobit regressions since some firms cannot use stock due to a low supply or other firm constraints. In this analysis, I do not include proportions of stock and cash or interactions between them and the public status indicators due to multicollinearity concerns. In the full specifications, I find both CEO RDE and CEO RIR are statistically positive and significant at the 1% level. A one-standard deviation increase in CEO RDE (CEO RIR) increases

[21] In unreported results, I test diversification using other measures, such as Fama-French 12 and 48 industry classifications, as well as one-digit, three-digit, and four-digit SIC codes. I find similar results for CEO RDE using FF12 and CEO RIR using FF48, one-digit, three-digit, and four-digit SIC codes.
[22] The upper and lower limits are 100% and 0%, respectively.

Table 3.3: Diversification and Acquirer Inside Debt

This table provides analysis of logistic models on the diversification choice of a target given the presence of CEO inside debt. The dependent variable is an indicator if the acquirer and target have a different Fama-French 12 industry classification. See the appendix for variable definitions. Year and industry controls using the Fama-French 48 industry classifications are included in all models. All errors in brackets are clustered by firm. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables of Interest						
CEO RDE	-0.014		-0.017		-0.012	
	[0.043]		[0.039]		[0.040]	
CEO RIR		-0.073***		-0.097***		-0.075***
		[0.026]		[0.029]		[0.028]
CEO Controls						
Age	-0.006	-0.007			-0.013	-0.009
	[0.011]	[0.015]			[0.011]	[0.015]
Gender	0.958**	0.888*			0.607	0.271
	[0.421]	[0.501]			[0.499]	[0.594]
Chairman	0.327*	0.244			0.275	0.194
	[0.183]	[0.247]			[0.193]	[0.260]
CEO Tenure	-0.023**	-0.038***			-0.026**	-0.042***
	[0.011]	[0.013]			[0.010]	[0.012]
CEO Ownership	1.472	6.094**			2.844*	9.210***
	[1.248]	[2.545]			[1.501]	[3.108]
Firm Controls						
Log (Assets)			0.096	0.002	0.089	0.018
			[0.073]	[0.090]	[0.071]	[0.090]
Leverage_{t-1}			0.022	0.059**	0.022	0.058**
			[0.018]	[0.027]	[0.018]	[0.028]
Return_{t}			0.003	0.003	0.003	0.002
			[0.002]	[0.004]	[0.002]	[0.004]
Return_{t-1}			0	0	0	0
			[0.002]	[0.003]	[0.001]	[0.003]
G-Index			0.043*	0.029	0.041*	0.03
			[0.023]	[0.031]	[0.023]	[0.031]
Firm Age			-0.002	-0.001	0.004	0.011
			[0.015]	[0.016]	[0.015]	[0.017]
Board Size			0.084**	0.05	0.094**	0.072
			[0.041]	[0.051]	[0.042]	[0.052]

Board Independence			0.003	0.007	0.002	0.008
			[0.004]	[0.007]	[0.005]	[0.007]
Merger Controls						
Private			1.16	1.48	1.255	1.202
			[1.016]	[1.315]	[1.041]	[1.203]
Public			1.017	1.34	1.123	1.098
			[0.953]	[1.229]	[0.984]	[1.115]
Subsidiary			0.83	1.24	0.951	1.015
			[1.014]	[1.297]	[1.038]	[1.181]
Of Stock			0.003	0.003	0.003	0.003
			[0.004]	[0.007]	[0.004]	[0.007]
Of Cash			0.005	0.009	0.005	0.009
			[0.004]	[0.006]	[0.004]	[0.006]
Number of Bidders			-1.672**	-2.014**	-1.712**	-2.056**
			[0.665]	[0.788]	[0.677]	[0.817]
Defensive Provisions			0.098	0.828	0.112	0.848
			[0.407]	[0.542]	[0.397]	[0.530]
Tender			0.303	0.188	0.309	0.21
			[0.437]	[0.531]	[0.442]	[0.546]
Hostile			1.525**	2.618***	1.627**	2.703***
			[0.664]	[0.779]	[0.676]	[0.805]
Public * Cash			0.095	-0.128	0.051	-0.119
			[0.445]	[0.577]	[0.453]	[0.586]
Public * Stock			-0.317	0.293	-0.267	0.402
			[0.465]	[0.614]	[0.464]	[0.614]
Private * Cash			0.333	0.201	0.36	0.25
			[0.401]	[0.557]	[0.406]	[0.559]
Private * Stock			0.354	0.398	0.366	0.432
			[0.544]	[0.758]	[0.538]	[0.765]
Subsidiary * Cash			0.384	0.291	0.302	0.261
			[0.411]	[0.533]	[0.408]	[0.529]
Constant	13.680***	11.534***	11.028***	9.837***	9.629***	8.327***
	[0.178]	[1.683]	[1.386]	[1.786]	[1.618]	[2.199]
Pseudo R^2	0.13	0.18	0.17	0.22	0.17	0.23
Observations	3607	2216	3584	2192	3519	2167

Table 3.4: Stock Payment in the Presence of CEO Inside Debt

This table provides analysis of Tobit models on the proportion of stock used in making a payment for the merger given the presence of CEO inside debt in the sample period from 1996 to 2006. The dependent variable is the percentage of stock used as payment in the merger transaction. Merger controls include if the transaction is considered a merger of equals and an indicator if the target firm is private. See the appendix for variable definitions. Industry controls are also provided using the Fama-French 48 industry classifications. Year fixed effects are included in all models. All errors in brackets are clustered by firm. Significance is depicted by *,**, and *** at the 10%, 5%, and 1% levels, respectively.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables of Interest						
CEO RDE	7.692***		3.720***		6.235***	
	[1.018]		[0.816]		[0.866]	
CEO RIR		-1.047**		1.179***		1.106***
		[0.469]		[0.407]		[0.394]
CEO Controls						
Age	-1.386***	-0.452***			0.632***	0.834***
	[0.091]	[0.100]			[0.082]	[0.087]
Gender	-4.88	-26.363***			13.580***	1.883
	[5.136]	[5.765]			[4.669]	[5.033]
Chairman	-10.682**	-17.706***			-17.794***	-36.054***
	[4.569]	[5.263]			[3.937]	[4.320]
CEO Tenure	0.835***	0.851**			0.911***	0.765***
	[0.295]	[0.351]			[0.245]	[0.287]
CEO Ownership	-7.407*	-88.602**			9.999***	194.970***
	[4.141]	[43.550]			[2.136]	[26.808]
Firm Controls						
Log (Assets)			-13.571***	-1.431**	-13.545***	0.505
			[0.542]	[0.560]	[0.562]	[0.563]
Leverage_{t-1}			20.947**	4.215	21.206**	4.622
			[8.270]	[3.246]	[8.433]	[4.365]
Return_t			-0.053***	-0.003	-0.045***	0.02

			[0.012]	[0.041]	[0.012]	[0.040]
$Return_{t-1}$			0.224***	0.457***	0.238***	0.427***
			[0.018]	[0.046]	[0.019]	[0.048]
G-Index			-1.344***	1.546***	-0.981**	1.707***
			[0.425]	[0.445]	[0.439]	[0.445]
Firm Age			1.321***	-0.017	0.864***	-0.325
			[0.303]	[0.358]	[0.317]	[0.363]
Board Size			0.822*	3.794***	0.822*	4.162***
			[0.425]	[0.429]	[0.438]	[0.428]
Board Independence			-0.339***	-0.439***	-0.223***	-0.192***
			[0.062]	[0.068]	[0.065]	[0.068]
Merger Controls						
Merger of Equals			206.619***	98.755***	216.099***	105.862***
			[7.154]	[8.538]	[7.266]	[8.944]
Private			94.427***	555.064***	88.567***	548.918***
			[3.578]	[3.444]	[3.810]	[3.637]
Public			223.531***	671.637***	222.126***	671.648***
			[3.416]	[3.875]	[3.586]	[3.997]
Subsidiary			-1.24	481.653***	-5.99	476.030***
			[4.556]	[5.728]	[4.541]	[5.394]
Number of Bidders			48.438***	75.176***	41.777***	76.515***
			[6.361]	[7.138]	[6.500]	[7.137]
Defensive Provisions			79.213***	63.086***	75.995***	62.832***
			[3.761]	[3.989]	[3.806]	[3.981]
Tender			-232.087***	-196.590***	-232.598***	-194.381***
			[4.041]	[4.791]	[4.072]	[4.820]
Hostile			20.794***	24.941***	22.705***	21.137**
			[8.032]	[8.974]	[8.086]	[8.893]
Constant	-932.899***	-714.966***	-695.363***	-1,088.571***	-746.446***	-1,200.457***
	[5.175]	[5.824]	[4.512]	[5.027]	[4.704]	[5.064]
Pseudo R^2	0.05	0.07	0.13	0.16	0.13	0.16
Observations	3607	2216	3584	2192	3519	2167

the proportion of stock used by 12.2% (5.2%). With respect to the full models, CEOs are more likely to use stock if they are older, male, not the Chairman, have more tenure, and own more stock in the company. Firms are more likely to use stock to pay for an M&A if lagged leverage is higher, contemporaneous return is lower, lagged return is higher, board size is larger, and board independence is lower. Acquisitions are more likely to have stock payments if the M&A is a merger of equal, has more bidders and defensive provisions, and is considered hostile. Stock is used to acquire private and subsidiary targets, whereas cash is preferred for public acquisitions.

Finally, I analyze how relative deal value is affected by inside CEO debt. Table 3.5 models CEO inside debt on deal value scaled by the acquirer's market value to measure the size effect in the presence of inside debt. Using OLS, the full model of CEO RDE explains 28% of the variation. I find CEO RDE is negative and significant in all models, which is consistent with H4b. According to model 5, a 1% increase in CEO RDE decreases relative deal value by 1.5%. A one-standard deviation increase in CEO RDE decreases relative deal value by 3.4%. Older CEOs tend to choose lower-sized targets. Firms with larger size, lower contemporaneous return, and lower board size engage in relatively smaller deals. Mergers are larger if it is considered a merger of equals, has fewer bidders, is not a tender offer, and is considered hostile. Targets are larger if stock is used more relative to cash. Private cash deals are relatively smaller by 30%.

3.5. Robustness

First, I analyze the level of inside debt. As demonstrated in the summary statistics, CEO RDE has a widely skewed distribution, which is true of most components of executive

Table 3.5: Deal Value in the Presence of Inside CEO Debt

This table provides analysis of ordinary least squares (OLS) models on the value of the merger deal (according to SDC Platinum) given the presence of CEO inside debt. The dependent variable is the deal value scaled by the acquirer's market value of equity. See Table 4 or the Appendix for variable definitions. Year fixed effects are included in all models. All errors in brackets are clustered by firm. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables of Interest						
CEO RDE	-0.016		-0.014*		-0.016*	
	[0.010]		[0.008]		[0.009]	
CEO RIR		0.001		0		0
		[0.002]		[0.002]		[0.002]
CEO Controls						
Age	-0.004**	-0.001			-0.003*	-0.002**
	[0.002]	[0.001]			[0.001]	[0.001]
Gender	-0.014	-0.063*			-0.015	-0.068*
	[0.047]	[0.037]			[0.064]	[0.037]
Chairman	0.039	0.003			0.058	0.019
	[0.031]	[0.019]			[0.039]	[0.020]
CEO Tenure	-0.003	0			-0.003	0.001
	[0.002]	[0.001]			[0.002]	[0.001]
CEO Ownership	-0.014	0.165			-0.014	0.137
	[0.012]	[0.113]			[0.013]	[0.098]
Firm Controls						
Log (Assets)			-0.022**	-0.020***	-0.024***	-0.021***
			[0.009]	[0.007]	[0.009]	[0.007]
Leverage_{t-1}			0.004	0.001	0.003	0
			[0.003]	[0.001]	[0.003]	[0.001]
Return_{t}			-0.001*	-0.000*	-0.001*	-0.000**
			[0.000]	[0.000]	[0.000]	[0.000]
Return_{t-1}			0	0	0	0
			[0.001]	[0.000]	[0.001]	[0.000]
G-Index			-0.002	-0.002	-0.003	-0.002
			[0.002]	[0.002]	[0.002]	[0.002]
Firm Age			-0.003	-0.001	-0.003	-0.001
			[0.003]	[0.002]	[0.003]	[0.002]
Board Size			-0.017**	-0.013***	-0.016**	-0.012**
			[0.008]	[0.005]	[0.008]	[0.005]

Board Independence			-0.001	-0.001	-0.002	-0.001*
			[0.001]	[0.000]	[0.001]	[0.000]
Merger Controls						
Merger of Equals			0.976***	0.721***	0.966***	0.729***
			[0.321]	[0.066]	[0.342]	[0.065]
Private			-0.185***	-0.226**	-0.179**	-0.226**
			[0.064]	[0.102]	[0.073]	[0.103]
Public			0.029	0.024	0.029	0.02
			[0.070]	[0.106]	[0.079]	[0.107]
Subsidiary			-0.127*	-0.176*	-0.117	-0.176*
			[0.069]	[0.103]	[0.080]	[0.104]
Of Stock			0.001***	0.001	0.001***	0.001
			[0.000]	[0.000]	[0.000]	[0.000]
Of Cash			0.001***	0.001*	0.001***	0.001**
			[0.000]	[0.000]	[0.000]	[0.000]
Number of Bidders			0.047	0.064	0.06	0.064
			[0.058]	[0.067]	[0.056]	[0.068]
Defensive Provisions			-0.12	0.008	-0.117	0.004
			[0.104]	[0.039]	[0.102]	[0.039]
Tender			0.006	0.034	0.016	0.044
			[0.042]	[0.050]	[0.040]	[0.049]
Hostile			0.056	0.063	0.061	0.068
			[0.064]	[0.071]	[0.063]	[0.072]
Public * Cash			-0.218***	-0.257***	-0.234***	-0.275***
			[0.053]	[0.056]	[0.052]	[0.058]
Public * Stock			-0.04	-0.238***	-0.034	-0.233***
			[0.171]	[0.052]	[0.171]	[0.052]
Private * Cash			-0.049	-0.033	-0.057	-0.047
			[0.041]	[0.034]	[0.043]	[0.034]
Private * Stock			-0.133***	-0.073	-0.129***	-0.071
			[0.050]	[0.049]	[0.049]	[0.050]
Subsidiary * Cash			-0.091**	-0.069*	-0.106***	-0.087**
			[0.037]	[0.037]	[0.036]	[0.037]
Constant	0.438**	0.205**	0.703***	0.628***	0.913***	0.753***
	[0.188]	[0.086]	[0.180]	[0.112]	[0.239]	[0.146]
R^2	3607	2216	3584	2192	3519	2167
Observations	0.04	0.09	0.11	0.27	0.12	0.28

compensation. To circumvent this, I analyze the indicator of log (RDE) > 0[23]. The results of the models are shown in Table 3.6 and reveal continued evidence in support of H1 and H3a. In results not shown, I also tested the difference in the CEO and firm debt-to-equity ratios. I find the hypotheses hold in all models pertaining to the merger only data[24]. I also test lags of inside debt with respect to the models. I find the first lag of CEO RDE is robust only in the case of using more stock to pay for M&A. The first and second lags of CEO RIR are robust in the cases of diversification and stock payment. I also directly tests levels of inside debt not scaled by firm debt and find no significant results.

Furthermore, I consider changes in firm risk after an M&A. Table 3.7 provides results about volatilities of firms sorted by high and low levels of inside debt. Volatility is calculated as the standard deviation of daily stock returns from the 70 trading days to 10 trading days before the M&A and from 10 trading days to 70 trading days after the M&A. Volatility difference is calculated as the difference between Volatility Before and Volatility After. I find firm risk before the merger is higher for the firm who pays the CEO with high levels of inside debt. After the merger event, the volatility after is lower, yielding a positive and significant difference, suggesting CEOs with high levels of inside debt engage in M&A in order to lower risk. For firms with low levels of inside debt, the opposite occurs. Firm risk increases after the M&A.

I also consider returns to investigate if long-term incentives affect M&A outcomes. I test three-day and five-day cumulative abnormal returns (CARs) using the Fama-French three factor

[23] This is the same measure used by Cassell et al. (2012), except I use the logarithmic transformation. Ln(1) = 0.
[24] I would like to thank an anonymous seminar participant for this suggestion.

Table 3.6: Models with Inside Debt Indicators

This table provides analysis on all four hypotheses using an indicator if log (RDE) is greater than zero. Variable descriptions are described in the appendix. Industry controls are also provided using the Fama-French 48 industry classifications. Year fixed effects are included in all models. All errors in brackets are clustered by firm. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

Variable	Likelihood of Mergers	Diversification	Using Stock	Relative Deal Value
Variables of Interest				
CEO RDE > 1	-0.248	0.225	32.039***	-0.036
	[0.172]	[0.260]	[3.456]	[0.031]
CEO Controls				
Age	-0.003	-0.012	0.493***	-0.002
	[0.008]	[0.011]	[0.082]	[0.001]
Gender	0.1	0.585	8.749*	-0.011
	[0.231]	[0.495]	[4.689]	[0.067]
Chairman	-0.132	0.28	-18.835***	0.063
	[0.112]	[0.192]	[3.924]	[0.042]
CEO Tenure	0.009*	-0.025**	0.668***	-0.002
	[0.005]	[0.011]	[0.244]	[0.002]
CEO Ownership	-0.012	2.990**	4.953**	-0.002
	[0.236]	[1.478]	[2.501]	[0.007]
Firm Controls				
Log (Assets)	0.329***	0.096	-13.901***	-0.022**
	[0.040]	[0.071]	[0.562]	[0.010]
Leverage_{t-1}	-0.714**	0.026	12.703	0.004
	[0.306]	[0.021]	[8.257]	[0.004]
Return_{t}	0.001	0.003	-0.048***	-0.001*
	[0.001]	[0.002]	[0.012]	[0.000]
Return_{t-1}	0.002***	0	0.230***	0
	[0.001]	[0.001]	[0.019]	[0.001]
G-Index	0.022	0.042*	-0.870**	-0.002
	[0.015]	[0.023]	[0.439]	[0.002]
Firm Age	-0.003	0.003	0.975***	-0.003
	[0.009]	[0.014]	[0.320]	[0.003]
Board Size	-0.043**	0.093**	1.077**	-0.017**
	[0.022]	[0.042]	[0.438]	[0.009]
Board Independence	0	0.002	-0.124*	-0.002
	[0.003]	[0.005]	[0.065]	[0.001]

Merger Controls				
Merger of Equals			218.559***	0.974***
			[7.467]	[0.346]
Private		1.233	91.842***	-0.189***
		[1.034]	[3.958]	[0.068]
Public		1.102	226.415***	0.017
		[0.976]	[3.578]	[0.073]
Subsidiary		0.925	-2.99	-0.127*
		[1.031]	[4.497]	[0.073]
Of Stock		0.003		0.001***
		[0.004]		[0.000]
Of Cash		0.005		0.001***
		[0.004]		[0.000]
Number of Bidders		-1.752**	47.069***	0.048
		[0.687]	[6.361]	[0.057]
Defensive Provisions		0.129	76.441***	-0.116
		[0.397]	[3.804]	[0.102]
Tender		0.291	-232.401***	0.011
		[0.439]	[4.092]	[0.041]
Hostile		1.656**	19.292**	0.067
		[0.684]	[8.007]	[0.062]
Public * Cash		0.036		-0.235***
		[0.451]		[0.053]
Public * Stock		-0.287		-0.045
		[0.466]		[0.166]
Private * Cash		0.349		-0.058
		[0.405]		[0.043]
Private * Stock		0.327		-0.148***
		[0.539]		[0.052]
Subsidiary * Cash		0.298		-0.109***
		[0.407]		[0.037]
Constant	-3.248***	11.320***	-760.288***	0.944***
	[0.726]	[1.477]	[4.723]	[0.254]
Pseudo R^2	0.07	0.18	0.13	
R^2				0.11
Observations	15798	3459	3519	3519

Table 3.7: Risk and Return from M&A

This table provides t-tests and rank sum tests between volatility differences before and after the M&A through sorting by high and low CEO RDE. Volatility before is the standard deviation of stock returns from 70 trading days before to 10 trading days before the M&A. Volatility after is the standard deviation of stock returns from 10 trading days after to 70 trading days after the M&A. Volatility difference is the difference between volatility before and volatility after. CARs are generated using a Fama-French three factor model including momentum for data 120 days before to 5 days before an M&A. CAR(-1,1) is the sum of the cumulative abnormal returns one day before through one day after the M&A. CAR(-2,2) is the sum of the cumulative abnormal returns two days before through two days after the M&A.

	CEO RDE > 1			CEO RDE < 1						
Variable	N	Mean	Median	N	Mean	Median	Mean Dif	T-Stat	Med Dif	Z-Stat
Volatility Before	345	0.319	0.03	3527	0.049	0.02	-0.270	-6.866***	-0.01	-3.287***
Volatility After	345	0.054	0.03	3527	0.149	0.02	0.095	0.700	-0.01	-3.662***
Volatility Difference	345	0.264	0.00	3527	-0.100	0.00	0.364	-2.583***	-0.00	-6.632***
CAR (-1,1)	345	-0.866	-1.00	3527	-0.892	-1.00	0.026	-0.948	0.00	-1.831*
CAR (-2,2)	345	-0.866	-1.00	3527	-0.893	-1.00	0.027	-0.936	0.00	-1.808*

model with momentum to generate returns and use the initial merger announcement date as the event date. I use data starting four months from the merger announcement to five trading days before the announcement to generate the model. I find no statistical relationship between inside debt and acquirer CARs.

The next robustness test concerns the first hypothesis of M&A propensity. Selection bias may have occurred due to the limiting constraints of the M&A analyzed. Thus, I gather data from Compustat concerning the value of acquisitions on the balance sheet. I use this as a dependent variable and run OLS regressions in Table 3.8. I find CEO RDE and acquisitions have a negative and statistically significant relationship at the 1% level, consistent with the primary results that firms with higher inside debt have a lower M&A propensity.

I also directly test the relationship between inside debt and capital expenditures. Cassell et al. (2012) cite the relationship should be negative but use R&D expenditure to test the hypothesis. Coles et al. (2006) find a negative relationship between managerial risk-taking and capital expenditures since investment in PP&E has a relatively lower risk than R&D. Table 3.9 presents the results. I also control for the CEO Vega/Delta, which is the Core and Guay (2002) ratio of the sensitivity of stock price volatility to the sensitivity of stock price. I find a positive association between inside debt and capital expenditures with respect to CEO RIR and CEO RIRCA. The first two models show a positive and statistically significant relationship between capital expenditures and CEO Vega/Delta, but its magnitude is economically insignificant. For all models I find male CEOs and firms with a lower G-index invest more in less risky capital expenditures.

Table 3.8: Association between Acquisition Activity and Inside Debt

This table provides OLS analysis on the association of the value of acquisitions scaled by total assets to inside debt. See the appendix for variable definitions. Industry controls are also provided using the Fama-French 48 industry classifications. Year fixed effects are included in all models. All errors in brackets are clustered by firm. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables of Interest						
CEO RDE	-0.002***		-0.002***		-0.002***	
	[0.000]		[0.000]		[0.000]	
CEO RIR		0.000*		0		0
		[0.000]		[0.000]		[0.000]
CEO Controls						
Age	0	0			0	0
	[0.000]	[0.000]			[0.000]	[0.000]
Gender	-0.005	0			-0.004	0.001
	[0.007]	[0.010]			[0.007]	[0.010]
Chairman	0.001	0			0.002	0
	[0.002]	[0.003]			[0.002]	[0.003]
CEO Tenure	0	0			0	0
	[0.000]	[0.000]			[0.000]	[0.000]
CEO Ownership	-0.006	-0.023***			-0.007	-0.027***
	[0.007]	[0.006]			[0.008]	[0.006]
Firm Controls						
Log (Assets)			0	-0.001	-0.001	-0.001
			[0.001]	[0.001]	[0.001]	[0.001]
$Leverage_{t-1}$			0	-0.001	0	-0.001
			[0.000]	[0.002]	[0.000]	[0.002]
$Return_t$			0	0	0	0
			[0.000]	[0.000]	[0.000]	[0.000]
$Return_{t-1}$			0.000**	0.000**	0.000**	0.000**
			[0.000]	[0.000]	[0.000]	[0.000]
G-Index			0	0	0	0
			[0.000]	[0.000]	[0.000]	[0.000]
Firm Age			0.000*	0.000*	0	0
			[0.000]	[0.000]	[0.000]	[0.000]
Board Size			-0.001*	-0.001**	-0.001*	-0.001**
			[0.000]	[0.001]	[0.000]	[0.001]
Board Independence			0	0	0	0
			[0.000]	[0.000]	[0.000]	[0.000]
Constant	0.005	0.032	0.003	0.045***	0.008	0.049**
	[0.011]	[0.021]	[0.007]	[0.014]	[0.013]	[0.022]
R^2	0.06	0.07	0.06	0.08	0.06	0.08
Observations	15060	9058	14981	9038	14626	8853

Table 3.9: Association between Capital Expenditures and Inside Debt

This table provides OLS analysis on the association of the value of capital expenditures scaled by total assets to inside debt. CEO Vega/Delta is the Core and Guay (2002) ratio of the sensitivity of stock price volatility to the sensitivity of stock price. See the appendix for variable definitions. Industry controls are also provided using the Fama-French 48 industry classifications. Year fixed effects are included in all models. All errors in brackets are clustered by firm. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1	Model 2	Model 3	Model 4
Variables of Interest				
CEO RDE	0			
	[0.000]			
CEO RDE > 1		-0.002		
		[0.003]		
CEO RIR			0.001*	
			[0.000]	
CEO RIRCA				0.001*
				[0.000]
CEO Controls				
CEO Vega/Delta	0.000***	0.000***	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
CEO Age	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
Gender	0.014***	0.014***	0.008*	0.008*
	[0.004]	[0.004]	[0.005]	[0.005]
Chairman	-0.002	-0.003	0.001	0.001
	[0.003]	[0.003]	[0.003]	[0.003]
CEO Tenure	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
CEO Ownership	0.004	0.003	0.01	0.01
	[0.004]	[0.004]	[0.009]	[0.009]
Firm Controls				
Log (Assets)	-0.003**	-0.003**	-0.002	-0.002
	[0.001]	[0.001]	[0.001]	[0.001]
Leverage_{t-1}	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
Return_{t}	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
Return_{t-1}	0.000***	0.000***	0.000**	0.000**
	[0.000]	[0.000]	[0.000]	[0.000]

G-Index	-0.001***	-0.001***	-0.001***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]
Firm Age	-0.001**	-0.001**	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
Board Size	0	0	0	0
	[0.001]	[0.001]	[0.001]	[0.001]
Board Independence	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	0.161***	0.161***	0.089***	0.086***
	[0.035]	[0.036]	[0.031]	[0.031]
Observations	15393	15393	9429	9429
R^2	0.4	0.4	0.36	0.36

One concern is the CEO effort level. I use wealth-performance sensitivity (WPS) since this measure is independent of firm size and shows the relationship between utility and performance. I use the scaled WPS, defined as the dollar change in CEO wealth per 100% change in firm value scaled by annual flow compensation (Edmans et al. 2009). Table 3.10 shows statistical differences between the medians only. CEOs with high inside debt have a lower scaled WPS in both the full sample and merger sample. Given the insignificant correlations in both samples are -0.01 for the full sample and -0.016 for the merger sample, I conclude effort, proxied by scaled WPS, has no effect on the debt incentive structure of the CEO.

3.6. Conclusion

Pensions and deferred compensation incentivize CEOs to take into consideration the long-term effects of their decisions. Using measures similar to the firm's debt-to-equity ratio, I find CEOs who are paid with relatively more debt than the firm uses tend to act safely and choose to engage in fewer M&A, which are deemed risky investments. When CEOs do decide to choose this investment channel, the investments they make tend to be risk reducing. They pick smaller target

Table 3.10: Effort and Inside Debt

This table provides t-tests and rank sum tests between effort levels through sorting by high and low CEO RDE. Effort is measured with the Edmans et al. (2009) scaled wealth-performance sensitivity (WPS), calculated as the dollar change in CEO wealth per 100% change in firm value scaled by annual flow compensation.

	CEO RDE > 1			CEO RDE < 1						
Variable	N	Mean	Median	N	Mean	Median	Mean Dif	T-Stat	Med Dif	Z-Stat
Scaled WPS Full Sample	1743	8.890	4.22	15925	96.562	6.71	87.67	1.284	2.49	19.736***
Scaled WPS Merger Sample	345	11.62	4.36	3527	297.274	7.57	285.612	0.943	3.19	8.840***

firms in the same industry as their firm. They use a higher proportion of stock and less cash for these deals. These findings suggest the optimal CEO debt-to-equity ratio with respect to his compensation should be close to one in order to mitigate agency conflicts between bondholders and stockholders. Greater inside debt incentivizes CEOs to make less risky decisions which can benefit bondholders over shareholders. Future research can investigate CEO inside debt effects on other issues of investment and financing.

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APPENDIX

Variable	Description
Age	age of the CEO
Gender	indicator if the CEO is male
Log (Assets)	Natural log of the total assets of the acquiring firm
CEO RDE	$\dfrac{\dfrac{ltip}{shrown_{excl_{opts}} * prccf + \left(opt_{exer_{val}} + opt_{unex_{exer_{est_{val}}}} + opt_{unex_{unexer_{est_{val}}}}\right)}}{\dfrac{dltt + dlc}{csho * prccf}}$
	Natural log of the CEO's inside debt to the firm's debt established by Cassell et al. (2012), where the CEO has debt in the form of pension benefits and deferred compensation and equity in the form of stock and stock options (valued by Black-Scholes (1973) and the firm has current liabilities and long-term debt and equity valued as the total number of common shares outstanding multiplied by the current market price at the end of the fiscal-year
CEO RIR	$\dfrac{\dfrac{ltip}{shrown_{excl_{opts}} * prccf + \sum_1^3 delta_i * \ option\ type_i}}{\dfrac{dltt + dlc}{optosey * optprcby}}$
	Natural log of the CEO relative incentive ratio established by Wei and Yermack (2011), where the CEO has debt in the form of pension benefits and deferred compensation and equity in the form of stock and stock options (valued according to option delta by exercisability tranches using Black-Scholes (1973)) and the firm has current and long-term debt and equity options (valued by total employee options, the average outstanding exercise price, and assumed expiration of 4 years). I = 1 to 3 for each type of option (exercised, unexercised exercisable, and unexercised unexercisable), optosey is the total number of employee options, and optprcby is the average exercise price.
Of Stock	Amount the acquirer pays for the target in stock

Of Cash	Amount the acquirer pays for the target in cash
Merger of Equals	Indicates if the transaction is a merger of equals
Private	Indicates if the target firm is private
Public	Indicates if the target firm is public
Subsidiary	Indicates if the target firm is a subsidiary
Numbid	Indicates if the number of bidders is greater than one
Defenseprov	Indicates if the target had defensive provisions against takeover
Tender	Indicates if there was a tender offer
Hostile	Indicates if the M&A was unsolicited
Publiccash	Indicates if the target was public and the deal was paid for completely in cash
Publicstock	Indicates if the target was public and the deal was paid for completely in stock
Privatecash	Indicates if the target was private and the deal was paid for completely in cash
Privatestock	Indicates if the target was private and the deal was paid for completely in stock
Subcash	Indicates if the target was a subsidiary and the deal was paid for completely in cash
G-index	G-index from Gompers, Ishii, and Metrick (2003)
CEO Ownership	Percentage of shares owned (excluding options) by the CEO
Firm Age	Age of the firm in years as calculated from the IPO date
CEO Tenure	CEO length of employment in years with the current firm
$Return_t$	Total shareholder return for year t (including dividends)
Chairman	Indicates if the CEO is also the Chairman of the Board of Directors

Leverage	(dltt + dlc) / at
Board Size	Total number of persons on the Board of Directors
Board Independence	Percentage of board directors independent of the firm
Acquisitions	Aqc / at

CHAPTER FOUR

CEO INSIDE DEBT AND FIRM DEBT

4.1. Introduction

Firm capital structure and CEO compensation structure have been of interest to academicians and regulators for years. Until recently, capital structure has been analyzed in the context of *total* debt and *total* equity. New studies by Rauh (2006) and Colla et al. (2013) exploit a new database, Capital IQ, to breakdown the components of total debt, into commercial paper, drawn credit lines, senior and subordinated bonds and notes, term loans, and capital leases. This greater insight into firm capital structure can also provide additional insight into CEO compensation structure since modeling executive compensation similar to the firm's financing of assets with debt and equity has important implications for the alignment of manager incentives with stakeholders (Jensen and Meckling (1976)).

Data limitations have made joint analysis of firm capital and CEO compensation structures difficult. However, the Capital IQ database, starting in 2001, provides details of debt capital structure, such as types and term structures of debt instruments. Colla et al. (2013) demonstrate how to use this new data in their seminal work on debt specialization[25]. Similarly, Execucomp provides new details about executive pensions, starting in 2006, after new regulations from the SEC required further disclosure. Cassell et al. (2012) show how to use this new data to calculate measures of CEO inside debt, defined as the sum of pensions and deferred compensation.

[25] Specialization means the firm uses one or a few specific types of debt instruments.

With these data several recent studies have uncovered important new insights. For example, Wei and Yermack (2011) find that after the Securities and Exchange Commission (SEC) mandated pension reporting in 2006, firm risk and equity value declined as inside debt increased. In addition, Cassell et al. (2012) find that CEOs with high inside debt choose safe investments, such as capital expenditures over research and development (R&D) and higher working capital. This paper extends the literature by analyzing the various components of a firm's total debt and the new data on CEO's compensation structure using data from 2006 to 2011. Specifically, using Capital IQ, I breakdown the specific components of short-term and long-term debt to determine what types of debt instruments are preferred among CEOs with greater incentives to cater to debt holders. Doing so provides greater insight into how CEO incentives affect important financial policy decisions, such as specialization, maturity, and yields.

These new data provide opportunities to address several different questions related to compensation incentives. Jensen and Mecking (1976) argue that agency cost of debt could be completely eliminated if the CEO's compensation contract is set so his debt to equity ratio equals the debt to equity ratio of the firm so the owner-manager has no incentive to favor either security holder. However, inside debt above the optimal level will incentivize management to cater more to debt holder interests at the expense of shareholders[26]. Similarly, more recent studies argue that greater long-term debt in the CEO's compensation contract should lead to more conservative debt choices for the firm. For example, Edmans and Liu (2011) argue that long-term debt is more expensive over time and thus more firm short-term debt will be preferred to maintain a lower probability of default for the firm. Empirically, Cassell et al. (2012) find evidence that inside debt

[26] CEOs may create credit default swaps on their pension obligations to ensure their claims are senior, and the lenders may subordinate in the case of default. I would like to thank an anonymous seminar participant for this comment.

is positively correlated with safer firm debt decisions. Similar questions yet to be addressed empirically include: Is short-term debt or long-term debt used more? How does inside debt relate to debt holder concerns over yield and maturity? Answering these questions is essential to fully understanding the financial policy implications of incentivizing a CEO with more inside debt.

First, I analyze inside debt as another supply-side factor of debt specialization since firms have to compensate staff, especially the CEO, for their use of human capital. Using the Herfindahl-Hirschman index of type usage, I find firms who pay the CEO with more inside debt relative to other compensation tend to specialize the firm's capital structure more often than other firms. This is especially true for firms with 90% or more of their debt structure based on a specific class of debt. However, when I consider the interaction between inside debt and firm size (a proxy for information asymmetry), I find larger firms with larger amounts of CEO inside debt diversify their debt holdings[27].

Second, I examine the relation between inside debt and the various components of total debt and the probabilities and usage of each type of debt. Firms with high CEO inside debt are more likely to use commercial paper, senior bonds, and commercial loans; have a higher percentage of debt from drawn credit lines, and have a lower percentage of term loans; however, larger firms with high CEO inside debt are less likely to use commercial paper and senior bonds, have a lower percentage of debt from drawn credit lines and commercial loans, and have a higher percentage of debt from term loans.

Finally, I consider specific components of debt important to debt holders, namely, interest rates and maturity. Since higher inside debt compensation is associated with CEOs making safer

[27] I would like to thank my discussant Emilia Garcia-Appendini at the 2014 IBEFA conference in Denver, CO for this suggestion.

decisions (Cassell et al. (2012)), CEO's with higher debt compensation might be expected to make bonds less risky and thus warranting a lower rate. However, after controlling for factors related to bankruptcy, such as profitability and cash flow volatility, I find firms with higher inside debt tend to reward debt holders, on average, with higher interest rates and longer issue maturities. Higher inside debt, especially above the firm's debt-to-equity ratio, incentivizes the CEO to cater more to the needs and desires of debt holders and less to stockholders and debt holders tend to prefer higher interest payments, just as shareholders prefer higher dividends. In addition, longer maturities are preferred for investors concerned about retirement and Sundaram and Yermack (2007) find CEOs with higher inside debt are also concerned with longer time horizons. However, the effect is the opposite for larger firms with large CEO inside debt holdings. One explanation for this can be asymmetry. In smaller firms the issuance of long-term securities is more of a signal of sustainability, and this signal is more believable the more inside debt the CEO has, whereas in larger firms the long term sustainability of the firm is less of a concern; thus, there is no need to signal and thus the CEO makes conservative safe decisions.

This paper contributes to the literature in several ways. First, I provide another variable to consider with supply-side effect analysis of debt specialization with inside debt. Second, I provide a benchmark for future analysis of specific debt instruments left unexplored, including total trust-preferred stock, a component of "other" debt. Third, I demonstrate that structures of inside debt and firm debt are interrelated. Finally, the evidence here provides regulatory authorities with further evidence on how CEO inside debt affects financial decision-making.

This paper is organized as follows. Section 4.2 provides a literature review. Section 4.3 explains the dataset and methodology. Section 4.4 interprets the results. Section 4.5 discusses robustness. Section 4.6 concludes.

4.2. Literature Review and Hypothesis Development

Jensen and Meckling (1976)) argue that firms should match debt and equity incentives of the firm and CEO in order to mitigate agency costs. However, only recently has the literature on executive compensation expanded from primarily stocks and stock options to include the overall compensation structure; specifically, it has started to analyze CEO inside debt holdings, such as pensions and deferred payments. For example, Sundaram and Yermack (2007) use IRS filings for pension data and find inside debt increases as CEOs age, and higher inside debt incentivizes CEOs to manage firms more conservatively. Similarly, Edmans and Liu (2011) find that as a manager's debt-to-equity ratio relative to the firm's debt-to-equity ratio decreases, firm risk increases. Rauh (2006) finds firms with large pension obligations are financially constrained and invest less. Thus, prior literature reveals that CEO compensation incentives affect firm investment and firm risk.

Cassell et al. (2012) find that large CEO inside debt holdings are negatively associated with risky investing and financial policies at the balance sheet level. They argue that CEOs want to reduce bankruptcy risk to preserve firm value. However, that value can be skewed toward debt holders. White (2012) finds that CEOs with higher inside debt are less likely to issue large dividends. Furthermore, Liu et al. (2014) find that CEO inside debt is positively associated with firm cash holdings. Though they find that this relationship deteriorates during credit events, and the overall cash value declines as CEO inside debt increases. In sum, these findings reveal that CEO inside debt can have significant effects on the firm's balance sheet.

Debt heterogeneity can provide additional understanding of the firm's capital structure and previous literature reveals significant heterogeneity. For example, Rauh and Sufi (2010) find that low-credit-quality firms are more likely to use debt with various types of covenants. Rauh and Sufi (2012)) find that cross-sectionally, the capital structure of other firms producing similar output is

related to assets used in the production process. Colla et al. (2013) finds that debt diversification occurs for large rated firms, but small unrated firms tend to specialize. Denis and McKeon (2012) find that firms increase leverage with debt for operations, not for large equity payouts. They also find that debt is reduced if a financial surplus occurs, but debt is further increased upon a deficit. Hackbarth and Mauer (2012) find that financially unconstrained firms with few growth opportunities prefer senior debt, but constrained firms, irrespective of growth opportunities, prefer junior debt; lower-rated firms diversify across debt classes. Since firms with high CEO inside debt are larger, older, unconstrained firms (Sundaram and Yermack (2007)), these firms are expected to engage in debt diversification.

Hypothesis 1a: There is a negative relationship between CEO inside debt and firm debt specialization.

A different perspective considers the safer financing decisions of a CEO paid with inside debt (Cassell et al. 2012). Engaging in debt diversification involves many credit holders, which increases agency costs. Thus, the CEO would opt to choose fewer agents to prevent increasing the agency cost of debt (Jensen and Meckling (1976)). Moreover, conflicts of interest among many different debt holders can affect capital structure depending on the various claimants and their seniority. For example, firms in financial distress expect no help from short-term investors but can receive support from long-term investors with subordinate claims (Berglof and Von Thadden (1994)). During a credit event, bank debt is almost always moved to senior due to conflicts from legal contesting (Welch (1997)). In addition, the free-rider concern (Holmstrom (1982)) also makes having multiple creditors challenging. Finally, firm characteristics also influence debt choices. Hackbarth and Mauer (2012) find that large financially unconstrained companies with low growth prefer senior debt; small financially constrained companies prefer junior debt and

lower rated companies debt diversify. Since inside debt is widely used in larger companies (Sundaram and Yermack (2007)), I expect CEOs with larger inside debt holdings to prefer a specialized debt capital structure.

Hypothesis 1b: There is a positive relationship between CEO inside debt and firm debt specialization.

High inside debt firms have loans characterized by lower interest rates and fewer covenants (Anantharaman et al. 2013). Other debt instruments have this same characteristic. *Hypothesis 2a: There is a negative relationship between inside debt and issue interest rates.*

Alternatively, paying the CEO with relatively more debt than equity will incentivize him to cater to debt holders at the expense of shareholders (Jensen and Meckling (1976), Edmans and Liu (2011)). This catering would increase debt interest payments, lowering net income and payouts to shareholders. Also, higher interest rates mean a lower price on debt for investors due to the discounted present value of cash flows and additional riskiness of receiving cash flows from higher interest payments.

Hypothesis 2b: There is a positive relationship between inside debt and issue interest rates.

Edmans and Liu (2011) argue that higher inside debt reduces the probability of default and since Diamond (1991) finds better credit is associated with short-term debt, it follows that firms with higher inside debt prefer short-term debt. Moreover, Hart and Moore (1994) show short-term debt is preferred for assets like working capital and Cassell (2012) find a positive relation with inside debt and working capital. Finally, Anantharaman and Lee (2014) find that CEOs with higher wealth sensitivity shift risks more with pensions, which implies that risk-shifting will be more prevalent among CEOs with high inside debt; which in turn will lead to lower issue maturities.

Hypothesis 3a: There is a negative relationship between inside debt and issue maturities.

However, CEOs with higher levels of inside debt are conflicted: CEOs are incentivized to cater more towards debt holders who are concerned about credit risk and bankruptcy, but CEOs have compensation contingent on firm performance. Firms may signal their high quality to the market by issuing longer maturities in order to curtail the trade-off between maturity and risk and the issue of market overvaluation (Flannery (1986)). From the lender viewpoint, a firm with more debt and higher seniority ranking of CEO pay[28] makes the company a more risky prospect (Anantharaman et al. (2013)). Therefore, a contract with more debt may arise from the firm's standpoint through the channel of longer maturities[29]; i.e., the firm pays for a longer period of time to compensate the lender for additional risk.

Hypothesis 3b: There is a positive relationship between inside debt and issue maturities.

4.3. Data and Methodology

Debt data comes from Capital IQ. Financial information is from CRSP and Compustat. Executive compensation data comes from ExecuComp. Following Cassell et al. (2012), the dataset begins in 2006, since the Pension Protection Act of 2006[30] required companies to start reporting pension values, and ends in 2001. Financials and utilities are excluded from the analysis due to major differences in government regulation from other companies. Full details of variable definitions are provided in the Appendix.

I follow Cassell et al. (2012) and define four measures of CEO inside debt. The first is the CEO to firm debt/equity ratio (CEO RDE). Previous theory has constructed this variable in a manner so the optimal value is one, which indicates that the firm incentivize the CEO through both

[28] CEO inside debt compensation is relatively smaller in value than an outside debt instrument, but the seniority ranking of the inside debt may be an issue for potential lenders.
[29] Instruments with longer maturities provide more versatility for lenders who wish to securitize the instrument or use it for duration matching.
[30] For further information about the act, see http://www.gpo.gov/fdsys/pkg/PLAW-109publ280/pdf/PLAW-109publ280.pdf.

inside debt and inside equity in the same fashion as the firm's assets are financed with debt and equity (Edmans and Liu (2011)). CEO RDE is the natural log of the CEO's inside debt to the firm's debt, where the CEO has debt in the form of pension benefits and deferred compensation and equity in the form of stock and stock options. This is equal to [(CEO IDH / CEO EH)/(FD / FE)], where CEO IDH is the aggregated present value of pension benefits and deferred (long-term) compensation, CEO EH is the value of stock and stock options (reported by the firm), FD is total current liabilities and long-term debt, and FE is the reported stockholders' equity. The second measure of CEO inside debt is an indicator variable if CEO RDE > 1[31]. This variable indicates the firm does not have a theoretically optimal compensation structure. The firm has aligned interests more in favor of the debt holders rather than the current private stockholders and potentially future public stockholders.

The other two inside debt variables involve CEO incentives. I calculate the CEO relative incentive ratio (CEO RIR) using the same methodology for CEO RDE except the option value is calculated using Black-Scholes (1973) delta valuations for each type of option (exercised, unexercised, exercisable, and unexercised unexercisable). I also calculate FE using employee options and the average exercise price. The final inside debt variable uses CEO RIR but adjusts for future cash compensation (CEO RIRCA). This is calculated using the CEO expected decision horizon, which takes differences between the industry medians of tenure and age and sums them together. If this is equal or less than zero, the cash compensation for the current fiscal year is used. Otherwise, the cash compensation is multiplied by the expected decision horizon and added to deferred compensation and pension values.

[31] This is the inside debt calculation before the transformation with the natural log is taken.

The debt variables from Capital IQ follow Colla et al. (2013). The seven types of debt considered are commercial paper (CP), drawn credit lines (DC), term loans (TL), bonds and notes broken into categories of senior (SBN) and subordinated (SUB), capital leases (CL), and other debt including total trust-preferred stock (OTHER). Unlike Colla et al. (2013), I do not use the total adjustment variable. I found the debt variables from Capital IQ and Compustat were incompatible. Therefore, I calculate percentages using the debt data from Capital IQ only in order to facilitate a direct comparison[32]. These percentages are then used to calculate EXCL90, which is an indicator variable if a firm has more than 90% of debt in one type, and HHI, which is the Herfindahl-Hirschman index of debt type usage. Other variables calculated from Capital IQ include interest, defined as the natural log of the weighted average interest rate at issuance on all debt issues for each fiscal year, and maturity, defined as the natural log of the weighted average length of time to maturity at issuance on all debt issues for each fiscal year.

I follow Colla et al. (2013) and define the following controls for supply-side factors. Profitability is operating income before depreciation scaled by total assets. Tangibility is net property, plant, and equipment scaled by total assets. MB is the market value of equity, defined as the stock price at the end of the fiscal year multiplied by the common shares used to calculate earnings per share, plus the market value of debt, defined as the sum of debt in current liabilities, long-term debt, and preferred stock liquidating value less deferred taxes and investment tax credit, scaled by total assets. Size is the natural log of total assets. Dividend Payer indicates if a firm has positive common stock dividends. RD expenses is defined as research and development expenses scaled by total assets. Unrated indicates if the firm is not rated by S&P. CF volatility is the standard

[32] For instance, I take a random sample of three companies to determine how to adjust debt to correctly yield total debt from Compustat. In two of the three cases, a multiplier of ten works. In another case, a value of 100,000 is necessary. Thus, to avoid over manipulating and imputing the data, I use the totals found in Capital IQ to calculate necessary variables and values from Compustat to compute financial and compensation variables.

deviation of quarterly operating income over the previous 12 quarters scaled by total assets. To prevent the influence of outliers, all inside debt variables and CF volatility are Winsorized by 1% at both tails. Summary statistics are provided in Table 4.1.

Comparing the sample to Colla et al. (2013), I find my sample has slightly higher percentages of HHI and EXCL90. As reported in Table 4.1 Panel A, dividend paying firms occur more often in my sample at 66% versus 34.2% for Colla's sample. Measures of tangibility and market-to-book are slightly lower than their sample. Percentages of commercial paper, drawn credit lines, and other debt are higher in my sample, whereas term loans, subordinated bonds and notes, and commercial loans are slightly lower than their sample. Comparing the inside debt variables to Cassell et al. (2012), whose sample is in the midst of the financial crisis from 2006 to 2008, I find the inside debt variables have lower means and medians. 28% of my sample has inside debt at a level above the theoretical optimum (CEO RDE > 1).

Table 4.1 Panel B shows differences in firms with high or low CEO inside debt as defined by CEO RDE > 1 or CEO RDE < 1, respectively. Firms with high CEO inside debt use more commercial paper, senior bonds, credit lines, and other debt. Firms with low CEO inside debt use more term loans and subordinated bonds. Firms with high CEO inside debt have lower maturities than low CEO inside debt firms. Low CEO inside debt firms are more likely to be unrated than high CEO inside debt firms. High CEO inside debt firms are characterized by higher profitability, tangibility, market-to-book, and size relative to low CEO inside debt firms. High CEO inside debt firms pay a dividend more often than low CEO inside debt firms. Panel C of Table 4.1 shows similar differences with medians.

Table 4.1 Panel D summarizes the means of four categories based on high and low inside

Table 4.1: Summary Statistics

This table provided summary statistics of the data. Data is collected from Capital IQ from 2006 to 2011. Panel A provides statistics for the full sample. Panel B examines mean differences between high and low levels of CEO inside debt according to CEO RDE > 1. Panel C examines median differences using Wilcoxon tests. Panel D splits the sample into four groups based on CEO RDE and an indicator if total book leverage is greater than one. All variables are defined in the Appendix.

Panel A: Full Sample

Variable	N	Mean	Standard Deviation	Variable	N	Mean	Standard Deviation
Dependent Variables				*Variables of Interest*			
HHI	3725	0.562	0.267	CEO RDE	3725	-1.257	3.259
EXCL90	3725	0.248	0.432	CEO RDE > 1	3725	0.281	0.450
CP	3725	0.186	0.389	CEO RIR	3725	-2.726	3.573
DC	3725	0.803	0.398	CEO RIRCA	3725	-1.908	3.359
TL	3725	0.470	0.499	*Independent Variables*			
SBN	3725	0.748	0.434	PROFITABILITY	3723	0.132	0.095
SUB	3725	0.186	0.389	TANGIBILITY	3694	0.255	0.233
CL	3725	0.410	0.492	MB	3725	1.307	1.024
OTHER	3725	0.530	0.499	SIZE	3725	8.168	1.645
PERCP	3718	0.025	0.078	DIVIDEND PAYER	3725	0.659	0.474
PERDC	3718	0.323	0.334	RD EXPENSES	3725	0.018	0.042
PERTL	3718	0.118	0.222	UNRATED	3725	0.394	0.489
PERSBN	3718	0.388	0.340	CF VOLATILITY	3725	0.017	0.055
PERSUB	3718	0.047	0.153				
PERCL	3718	0.023	0.115				
PEROTHER	3718	0.077	0.171				
INTEREST	864	-0.670	1.157				
MATURITY	3573	6.016	1.147				

Panel B: Sample Means of Firms Split by High and Low CEO Inside Debt

Variable	CEO RDE < 1	CEO RDE > 1	Difference	T-Stat	P-value
Number of Observations	*2670*	*1048*			
HHI	0.561	0.566	-0.005	-0.555	0.579
EXCL90	0.251	0.238	0.014	0.878	0.380
CP	0.153	0.270	-0.117	-8.349	0.000
DC	0.809	0.789	0.020	1.354	0.176
TL	0.490	0.420	0.070	3.870	0.000
SBN	0.723	0.814	-0.091	-5.787	0.000
SUB	0.212	0.119	0.093	6.588	0.000
CL	0.395	0.448	-0.053	-2.942	0.003
OTHER	0.513	0.573	-0.061	-3.335	0.001
PERCP	0.019	0.041	-0.021	-7.541	0.000
PERDC	0.326	0.315	0.011	0.933	0.351
PERTL	0.134	0.077	0.057	7.103	0.000
PERSBN	0.363	0.450	-0.087	-7.072	0.000
PERSUB	0.054	0.029	0.025	4.532	0.000
PERCL	0.024	0.020	0.003	0.791	0.429
PEROTHER	0.080	0.068	0.011	1.849	0.065
INTEREST	-0.703	-0.604	-0.099	-0.867	0.386
MATURITY	6.081	5.85	0.231	5.439	0.000
PROFITABILITY	0.129	0.142	-0.013	-3.844	0.000
TANGIBILITY	0.250	0.268	-0.018	-2.076	0.000
MB	1.288	1.355	-0.066	-1.783	0.075
SIZE	8.111	8.311	-0.200	-3.337	0.001
DIVIDEND PAYER	0.606	0.794	-0.188	-11.035	0.000
RD EXPENSES	0.018	0.018	0.000	0.255	0.799
UNRATED	0.407	0.359	0.048	2.721	0.002
CF VOLATILITY	0.018	0.015	0.003	1.552	0.121

Panel C: Sample Medians of Firms Split by High and Low CEO Inside Debt

Variable	CEO RDE < 1	CEO RDE > 1	Difference	Z-Stat	P-value
Number of Observations	*2670*	*1048*			
HHI	0.482	0.506	-0.024	-0.709	0.478
EXCL90	0.000	0.000	0.000	0.878	0.380
CP	0.000	0.000	0.000	-8.273	0.000
DC	1.000	1.000	0.000	1.354	0.176
TL	0.000	0.000	0.000	3.862	0.000
SBN	1.000	1.000	0.000	-5.762	0.000
SUB	0.000	0.000	0.000	6.551	0.000
CL	0.000	0.000	0.000	-2.939	0.003
OTHER	1.000	1.000	0.000	-3.331	0.001
PERCP	0.000	0.000	0.000	-8.466	0.000
PERDC	0.211	0.200	-0.011	1.186	0.236
PERTL	0.000	0.000	0.000	6.138	0.000
PERSBN	0.323	0.493	-0.170	-7.229	0.000
PERSUB	0.000	0.000	0.000	6.609	0.000
PERCL	0.000	0.000	0.000	-2.841	0.005
PEROTHER	0.000	0.001	-0.001	-2.108	0.035
INTEREST	-0.350	-0.396	-0.046	-0.319	0.750
MATURITY	6.354	6.179	0.175	5.551	0.000
PROFITABILITY	0.123	0.138	-0.015	-4.341	0.000
TANGIBILITY	0.171	0.196	-0.025	-4.266	0.000
MB	1.002	1.109	-0.107	-3.527	0.000
SIZE	7.963	8.176	-0.213	-3.704	0.000
DIVIDEND PAYER	1.000	1.000	0.000	-10.861	0.000
RD EXPENSES	0.000	0.003	-0.003	-7.782	0.000
UNRATED	0.000	0.000	0.000	2.718	0.007
CF VOLATILITY	0.008	0.008	0.000	2.328	0.020

Panel D: Sample Means of Firms Split by CEO Inside Debt and Firm Leverage

Variable	CEO RDE < 1 Leverage < 1	CEO RDE < 1 Leverage > 1	CEO RDE > 1 Leverage < 1	CEO RDE > 1 Leverage > 1
Number of Observations	*2598*	*79*	1033	15
HHI	0.564	0.450	0.569	0.569
EXCL90	0.255	0.127	0.238	0.200
CP	0.152	0.190	0.270	0.267
DC	0.807	0.861	0.789	0.800
TL	0.483	0.709	0.419	0.467
SBN	0.208	0.354	0.119	0.133
SUB	0.208	0.354	0.119	0.133
CL	0.388	0.620	0.446	0.533
OTHER	0.513	0.506	0.574	0.533
PERCP	0.019	0.033	0.041	0.019
PERDC	0.332	0.147	0.316	0.234
PERTL	0.131	0.219	0.077	0.055
PERSBN	0.361	0.444	0.449	0.540
PERSUB	0.053	0.080	0.028	0.081
PERCL	0.024	0.014	0.021	0.002
PEROTHER	0.080	0.062	0.068	0.069
INTEREST	-0.717	-0.423	-0.600	-1.173
MATURITY	6.092	5.731	5.858	5.349
PROFITABILITY	0.127	0.190	0.141	0.193
TANGIBILITY	0.250	0.264	0.269	0.195
MB	1.269	1.918	1.343	2.152
SIZE	8.123	8.314	7.735	8.116
DIVIDEND PAYER	0.614	0.354	0.798	0.533
RD EXPENSES	0.018	0.018	0.018	0.026
UNRATED	0.414	0.190	0.361	0.200
CF VOLATILITY	0.017	0.025	0.014	0.045

debt and leverage, where leverage is defined by an indicator if total book leverage is greater than one. All cases demonstrate a difference between high and low inside debt based on the CEO RDE > 1 indicator variable. Major differences between the two subgroups should bias against finding significant results in later tables.

To further compare my results with Colla et al. (2013), I replicate their Table 8, in Table 4.2 here. They regress supply-side factors on the debt specialization variables of interest (HHI and EXCL90). Similar to their results, I find size is negative and significant. I find market-to-

Table 4.2: Supply Side Factors of Debt Specialization

This table replicates Table 8 of Colla et al. (2013) with my particular sample. The dependent variables are the Herfindahl-Hirschman index of debt type usage and an indicator if a firm has more than 90% of debt in one type. All independent variables are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Tobit	Tobit	Tobit	Tobit	Probit	Probit	Probit	Probit
	HHI	HHI	HHI	HHI	EXCL90	EXCL90	EXCL90	EXCL90
Size	-0.056***	-0.057***	-0.033***	-0.028***	-0.321***	-0.324***	-0.206***	-0.183***
	[0.006]	[0.006]	[0.007]	[0.007]	[0.042]	[0.042]	[0.048]	[0.049]
M/B	0.058***	0.058***	0.031***	0.026**	0.186***	0.192***	0.08	0.053
	[0.012]	[0.012]	[0.011]	[0.011]	[0.059]	[0.060]	[0.058]	[0.054]
Profitability	-0.238**	-0.247**	-0.099	-0.095	-0.398	-0.448	0.148	0.106
	[0.116]	[0.116]	[0.106]	[0.100]	[0.584]	[0.592]	[0.580]	[0.570]
Dividend Payer	-0.03	-0.03	-0.017	-0.022	-0.180*	-0.179*	-0.122	-0.126
	[0.019]	[0.019]	[0.018]	[0.017]	[0.097]	[0.097]	[0.099]	[0.098]
Tangibility	-0.086	-0.087	-0.06	-0.054	-0.486	-0.489	-0.397	-0.425
	[0.066]	[0.066]	[0.062]	[0.058]	[0.345]	[0.345]	[0.337]	[0.337]
CF Volatility		-0.206	-0.083	-0.056		-1.226	-0.677	-0.61
		[0.155]	[0.157]	[0.156]		[0.873]	[0.854]	[0.852]
RD Expenses			1.116***	0.946**			3.581**	3.034**
			[0.424]	[0.380]			[1.731]	[1.490]
Unrated			0.124***	0.088***			0.586***	0.379***
			[0.022]	[0.022]			[0.114]	[0.117]
Book Leverage				-0.307***				-1.610***
				[0.043]				[0.299]
Constant	1.080***	1.089***	0.814***	0.962***	2.081**	2.129**	0.918	1.567*
	[0.114]	[0.115]	[0.109]	[0.117]	[0.826]	[0.830]	[0.781]	[0.807]
Observations	2532	2532	2532	2532	2437	2437	2437	2437
Pseudo R^2	0.62	0.62	0.72	0.82	0.2	0.2	0.22	0.25

book is only significant in the first three models. R&D expenses is positive and significant in this analysis. Differing results may be due to a lack of a constant in their models, which I include in all my specifications, and the sample periods are different. My sample includes years just before, during, and after the Great Recession.

For the following results in Section 4, all models include year and industry fixed effects at the 2-digit SIC level. Firm-clustered standard errors robust to heteroskedasticity are included below all coefficients. All independent variables are lagged to reduce endogeneity concerns. Tobit models are double-censored, i.e., there is a lower limit set to zero and an upper bound set to one for all proportional variables of interest and HHI. The next section details analysis of inside debt and specialization using the measures of Colla et al. (2013). Then, I break down the HHI into its seven components for individual analysis of each debt type. Finally, I conclude with remarks and analysis on the associations between inside debt and debt characteristics of interest rates and maturity.

4.4. Empirical Results

After analyzing the original specification of (Colla et. al (2013)) in Table 4.2, now I introduce a control for CEO inside debt in the regressions in Table 4.3. Three of the four measures of inside debt are positive and statistically significant in their specifications. Six of the models have significance at the 1% level. Thus, firms with higher CEO inside debt specialize their debt structures. Larger firms debt diversify, which confirms previous findings (Colla et. al (2013)). Market-to-book is significant only in the Tobit regressions. RD Expenses, Unrated, and Book Leverage have statistically significant coefficients consistent with previous literature. All models also include an interaction term between the inside debt variable of interest and size, a

Table 4.3: Inside Debt Effect on Debt Specialization

This table provides analysis of debt specialization given the presence of CEO inside debt. The dependent variables are the Herfindahl-Hirschman index of debt type usage and an indicator if a firm has more than 90% of debt in one type. The other panels contain dependent variables of the relative percentage of the debt instrument used or an indicator if the firm uses the debt instrument type in question. All controls are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 Tobit HHI	Model 2 Tobit HHI	Model 3 Tobit HHI	Model 4 Tobit HHI	Model 5 Probit EXCL90	Model 6 Probit EXCL90	Model 7 Probit EXCL90	Model 8 Probit EXCL90
CEO RDE	0.039*** [0.010]				0.202*** [0.077]			
CEO RDE > 1		0.001 [0.087]				-0.244 [0.525]		
CEO RIR			0.032*** [0.009]				0.259*** [0.060]	
CEO RIRCA				0.033*** [0.010]				0.276*** [0.061]
Size	-0.034*** [0.007]	-0.030*** [0.007]	-0.047*** [0.009]	-0.045*** [0.008]	-0.196*** [0.050]	-0.209*** [0.054]	-0.306*** [0.055]	-0.303*** [0.053]
CEO RDE * Size	-0.004*** [0.001]				-0.018** [0.008]			
CEO RDE > 1 * Size		0.003 [0.010]				0.057 [0.066]		
CEO RIR * Size			-0.004*** [0.001]				-0.032*** [0.007]	
CEO RIRCA * Size				-0.004*** [0.001]				-0.035*** [0.007]
CEO Vega/Delta	0.014 [0.019]	-0.015 [0.018]	-0.019 [0.025]	-0.024 [0.026]	-0.046 [0.089]	-0.35 [0.408]	-0.507 [0.654]	-0.641 [0.726]

M/B	0.024**	0.025**	0.023**	0.024**	0.049	0.051	0.037	0.042
	[0.011]	[0.011]	[0.011]	[0.011]	[0.054]	[0.054]	[0.056]	[0.056]
Profitability	-0.103	-0.106	-0.073	-0.073	0.026	0.05	0.297	0.307
	[0.104]	[0.101]	[0.100]	[0.100]	[0.609]	[0.583]	[0.584]	[0.580]
Dividend Payer	-0.019	-0.026	-0.018	-0.019	-0.125	-0.15	-0.12	-0.126
	[0.017]	[0.017]	[0.017]	[0.017]	[0.098]	[0.100]	[0.099]	[0.100]
Tangibility	-0.06	-0.048	-0.062	-0.06	-0.425	-0.387	-0.505	-0.503
	[0.057]	[0.057]	[0.057]	[0.057]	[0.338]	[0.337]	[0.340]	[0.340]
CF Volatility	-0.024	-0.051	-0.065	-0.057	-0.381	-0.627	-0.553	-0.499
	[0.153]	[0.159]	[0.165]	[0.165]	[0.906]	[0.887]	[0.886]	[0.900]
RD Expenses	0.935**	0.957**	0.967**	0.940**	3.062**	3.180**	3.190**	3.006**
	[0.368]	[0.376]	[0.376]	[0.373]	[1.479]	[1.491]	[1.509]	[1.482]
Unrated	0.082***	0.088***	0.078***	0.078***	0.358***	0.368***	0.321***	0.309***
	[0.021]	[0.021]	[0.022]	[0.022]	[0.116]	[0.116]	[0.118]	[0.119]
Book Leverage	-0.282***	-0.303***	-0.284***	-0.289***	-1.426***	-1.585***	-1.439***	-1.506***
	[0.042]	[0.043]	[0.044]	[0.044]	[0.297]	[0.298]	[0.306]	[0.304]
Constant	1.002***	0.974***	1.051***	1.029***	1.581*	1.751**	2.198***	2.121***
	[0.120]	[0.127]	[0.114]	[0.112]	[0.812]	[0.883]	[0.806]	[0.819]
Observations	2532	2532	2532	2532	2437	2437	2437	2437
Pseudo R^2	0.85	0.83	0.84	0.84	0.26	0.25	0.26	0.27

proxy for information asymmetry. In six of the eight models I find a negative coefficient and statistically significance at the 1% level. This suggests larger firms with large CEO inside debt holdings diversify their debt instruments. The negative sign suggests that firm size diminishes the RDE effect; thus the CEO inside debt incentive is most effective in smaller firms.

Table 4.4 analyzes commercial paper usage. Interestingly, in model 1 I find firms who pay their CEOs above the optimal ratio of one use a higher percentage of commercial paper. Also in Model 2, I find the interaction term between inside debt and firm size is negative, suggesting larger firms who pay the CEO well above the optimal ratio use a lower percentage of commercial paper. Models 3 and 4 show the opposite. This suggests a conservative debt policy unless the CEO is incentivized to cater more to credit holders. CEOs with a high Vega-to-delta ratio have a negative association with commercial paper usage. Larger firms with a higher market-to-book ratio, higher profitability, and pay dividends use more commercial paper. Firms with higher cash flow volatility or are unrated use a lower percentage of commercial paper.

Models 5 through 8 analyze the likelihood of using commercial paper. Firms with higher inside debt and large firms have a higher likelihood of using commercial paper, but the interaction between inside debt and size is negative, suggesting information asymmetry mitigates this effect. With regards to the other controls, similar coefficients and significance as in models 1 through 4 are demonstrated throughout.

Table 4.5 investigates drawn credit lines. Models 1 and 2 show significance at the 1% level for firm size, suggesting larger firms use a lower percentage of drawn credit lines. According to Models 3 and 4, firms with higher inside debt incentives use a higher percentage of drawn credit lines. Larger firms use less, and the interaction between size and inside debt is also negative. Firms with higher R&D and leverage use a lower percentage of drawn credit. Unrated

Table 4.4: Inside Debt Effect on Commercial Paper Usage

This table provides analysis of commercial paper usage given the presence of CEO inside debt. The dependent variables are the amount of commercial paper used or if commercial paper was used at all. All controls are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 Tobit PerCP	Model 2 Tobit PerCP	Model 3 Tobit PerCP	Model 4 Tobit PerCP	Model 5 Probit CP	Model 6 Probit CP	Model 7 Probit CP	Model 8 Probit CP
CEO RDE	0.019				0.316**			
	[0.020]				[0.148]			
CEO RDE > 1		0.365***				3.039***		
		[0.141]				[0.840]		
CEO RIR			-0.024*				-0.016	
			[0.012]				[0.104]	
CEO RIRCA				-0.038***				-0.114
				[0.014]				[0.107]
Size	0.071***	0.087***	0.085***	0.087***	0.552***	0.725***	0.546***	0.570***
	[0.010]	[0.011]	[0.012]	[0.012]	[0.071]	[0.078]	[0.084]	[0.083]
CEO RDE * Size	-0.002				-0.035**			
	[0.002]				[0.015]			
CEO RDE > 1 * Size		-0.038**				-0.329***		
		[0.015]				[0.095]		
CEO RIR * Size			0.002**				-0.002	
			[0.001]				[0.011]	
CEO RIRCA * Size				0.004***				0.007
				[0.001]				[0.012]
CEO Vega/Delta	-1.165	-1.408*	-1.789**	-1.925**	-9.246	-6.591	-9.127**	-9.538**
	[0.826]	[0.729]	[0.816]	[0.831]	[5.882]	[4.266]	[4.294]	[4.273]
M/B	0.059***	0.060***	0.063***	0.063***	0.288***	0.304***	0.299***	0.302***
	[0.015]	[0.016]	[0.016]	[0.016]	[0.093]	[0.098]	[0.091]	[0.092]

Profitability	0.396**	0.392**	0.422**	0.442**	2.243**	2.243**	2.338**	2.479**
	[0.169]	[0.169]	[0.172]	[0.173]	[1.095]	[1.124]	[1.094]	[1.111]
Dividend Payer	0.155***	0.150***	0.152***	0.152***	0.810***	0.797***	0.799***	0.786***
	[0.034]	[0.033]	[0.034]	[0.034]	[0.185]	[0.186]	[0.181]	[0.183]
Tangibility	-0.016	-0.013	-0.005	0.002	0.313	0.306	0.337	0.373
	[0.098]	[0.093]	[0.099]	[0.100]	[0.620]	[0.604]	[0.618]	[0.623]
CF Volatility	-1.774**	-1.942**	-1.728**	-1.691*	-9.563*	-10.483*	-8.637*	-8.377*
	[0.870]	[0.924]	[0.864]	[0.864]	[5.360]	[5.755]	[5.023]	[4.982]
RD Expenses	-0.785	-0.792	-0.883	-0.88	-3.925	-4.368	-4.324	-4.461
	[0.537]	[0.527]	[0.548]	[0.542]	[3.032]	[3.113]	[3.005]	[3.022]
Unrated	-0.128***	-0.127***	-0.110**	-0.105**	-0.575**	-0.554**	-0.513**	-0.495*
	[0.046]	[0.046]	[0.046]	[0.046]	[0.252]	[0.259]	[0.258]	[0.259]
Book Leverage	0.034	0.037	0.015	0.008	0.296	0.313	0.11	0.05
	[0.066]	[0.067]	[0.065]	[0.064]	[0.400]	[0.398]	[0.395]	[0.390]
Constant	-1.062***	-1.250***	-1.172***	-1.170***	-6.938***	-8.824***	-6.868***	-7.071***
	[0.139]	[0.160]	[0.144]	[0.141]	[1.018]	[1.194]	[1.061]	[1.040]
Observations	2531	2531	2531	2531	2286	2286	2286	2286
Pseudo R^2	0.64	0.65	0.64	0.64	0.4	0.41	0.4	0.4

Table 4.5: Inside Debt Effect on Drawn Credit Line Usage

This table provides analysis of drawn credit line usage given the presence of CEO inside debt. The dependent variables are the amount of drawn credit lines or if drawn credit lines were used at all. All controls are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 Tobit PerDC	Model 2 Tobit PerDC	Model 3 Tobit PerDC	Model 4 Tobit PerDC	Model 5 Probit DC	Model 6 Probit DC	Model 7 Probit DC	Model 8 Probit DC
CEO RDE	0.017				-0.004			
	[0.014]				[0.098]			
CEO RDE > 1		0.087				0.085		
		[0.131]				[0.536]		
CEO RIR			0.043***				0.004	
			[0.012]				[0.063]	
CEO RIRCA				0.045***				0.018
				[0.013]				[0.066]
Size	-0.061***	-0.054***	-0.075***	-0.070***	-0.112**	-0.086*	-0.097*	-0.092*
	[0.009]	[0.010]	[0.011]	[0.011]	[0.044]	[0.045]	[0.050]	[0.048]
CEO RDE * Size	-0.002				-0.007			
	[0.001]				[0.011]			
CEO RDE > 1 * Size		-0.013				-0.042		
		[0.015]				[0.063]		
CEO RIR * Size			-0.004***				0	
			[0.001]				[0.007]	
CEO RIRCA * Size				-0.005***				-0.001
				[0.001]				[0.007]
CEO Vega/Delta	0.003	0.008	0.012	0.007	0.299	2.574	3.211	3.314
	[0.017]	[0.020]	[0.018]	[0.017]	[0.589]	[1.695]	[2.002]	[2.066]
M/B	0.005	0.006	0.001	0.003	-0.09	-0.093	-0.100*	-0.098
	[0.016]	[0.016]	[0.016]	[0.016]	[0.059]	[0.060]	[0.060]	[0.060]
Profitability	0.188	0.187	0.198	0.185	0.873	0.762	0.661	0.633

	[0.148]	[0.147]	[0.148]	[0.147]	[0.698]	[0.681]	[0.673]	[0.675]
Dividend Payer	0.012	0.015	0.017	0.017	0.072	0.116	0.072	0.075
	[0.024]	[0.024]	[0.024]	[0.024]	[0.110]	[0.111]	[0.109]	[0.110]
Tangibility	-0.003	-0.001	-0.01	-0.008	0.452	0.427	0.441	0.434
	[0.083]	[0.083]	[0.083]	[0.082]	[0.410]	[0.406]	[0.408]	[0.406]
CF Volatility	-0.147	-0.158	-0.193	-0.19	-1.408	-1.226	-1.182	-1.222
	[0.202]	[0.205]	[0.206]	[0.208]	[0.986]	[0.981]	[0.982]	[0.974]
RD Expenses	-1.423***	-1.432***	-1.381***	-1.417***	-4.933**	-4.979**	-4.777**	-4.762**
	[0.501]	[0.499]	[0.506]	[0.512]	[2.221]	[2.249]	[2.231]	[2.239]
Unrated	0.149***	0.149***	0.135***	0.134***	-0.008	-0.022	-0.029	-0.037
	[0.028]	[0.028]	[0.029]	[0.028]	[0.127]	[0.125]	[0.127]	[0.128]
Book Leverage	-0.427***	-0.434***	-0.387***	-0.389***	0.277	0.371	0.424	0.454
	[0.051]	[0.052]	[0.052]	[0.053]	[0.289]	[0.284]	[0.290]	[0.291]
Constant	0.892***	0.826***	0.966***	0.922***	0.996	0.732	0.846	0.809
	[0.134]	[0.141]	[0.156]	[0.155]	[0.785]	[0.816]	[0.798]	[0.789]
Observations	2531	2531	2531	2531	2371	2371	2371	2371
Pseudo R^2	0.4	0.4	0.4	0.4	0.18	0.17	0.17	0.17

firms use more drawn credit. Models 5 through 8 show little significance with respect to the likelihood of drawn credit. Similar results occur only for size and R&D. Thus, larger firms with higher inside debt demonstrate conservatism through less drawn credit.

Table 4.6 provides regressions for term loans. Models 1-4 demonstrate a negative and statistically significant relationship between term loan usage and inside debt. The interaction between inside debt and size is positive and significant in all regressions, suggesting asymmetric information leads firm to have a higher percentage of term loans, a conservative debt instrument. Dividend non-payers with a lower market-to-book ratio, higher profitability, and higher leverage use more term loans. Besides firm size and CEO inside debt, the controls in Models 5 through 8 for the likelihood of term loans is similar in size and significance. Thus, larger firms with larger CEO inside debt holdings use a higher percentage of term loans, again suggesting a more conservative debt policy as firm size increases. However, CEO inside debt has more of a role in smaller firms than in larger firms.

Table 4.7 analyzes bond usage. Panel A reports results for senior bonds. Model 1 shows a positive significant relationship between the percentage of subordinated bonds and firm size at the 1% level. Model 2 shows a negative and significant coefficient for firms who pay CEOs a portion of inside debt above the optimal ratio. Larger firms also use a higher proportion of senior bonds. The interaction term yields a negative result, suggesting information asymmetry leads to a lower usage of senior bonds. Models 3 and 4 demonstrate the opposite with respect to inside debt levels. Larger firms who pay dividends, have high R&D and leverage, and are rated use more senior bonds. With respect to the likelihood of using senior bonds in Models 5 through 8, three of the four inside debt variables are positive and significant. The interaction term for size and inside debt is negative and significant, once again suggesting conservatism through a lower

Table 4.6: Inside Debt Effect on Term Loan Usage

This table provides analysis of term loan usage given the presence of CEO inside debt. The dependent variables are the amount of term loans used or if term loans were used at all. All controls are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 Tobit PerTL	Model 2 Tobit PerTL	Model 3 Tobit PerTL	Model 4 Tobit PerTL	Model 5 Probit TL	Model 6 Probit TL	Model 7 Probit TL	Model 8 Probit TL
CEO RDE	-0.031*				-0.081			
	[0.017]				[0.064]			
CEO RDE > 1		-0.348***				-0.737		
		[0.132]				[0.518]		
CEO RIR			-0.034***				-0.019	
			[0.012]				[0.060]	
CEO RIRCA				-0.030**				-0.007
				[0.013]				[0.062]
Size	-0.015	-0.029***	-0.005	-0.01	0.079*	0.049	0.071	0.069
	[0.010]	[0.010]	[0.013]	[0.013]	[0.043]	[0.044]	[0.052]	[0.050]
CEO RDE * Size	0.003*				0.008			
	[0.002]				[0.007]			
CEO RDE > 1 * Size		0.036**				0.07		
		[0.015]				[0.062]		
CEO RIR * Size			0.004***				0.002	
			[0.001]				[0.007]	
CEO RIRCA * Size				0.003**				0.001
				[0.001]				[0.007]
CEO Vega/Delta	0.019	0.032	0.033	0.038	0.283	0.382	0.392	0.413
	[0.030]	[0.025]	[0.029]	[0.028]	[0.204]	[0.285]	[0.308]	[0.336]
M/B	-0.039**	-0.040**	-0.037**	-0.039**	-0.126**	-0.128**	-0.128**	-0.130**
	[0.017]	[0.016]	[0.017]	[0.017]	[0.064]	[0.063]	[0.064]	[0.064]
Profitability	0.302*	0.314*	0.289*	0.300*	1.177**	1.211**	1.171**	1.169**

	[0.170]	[0.166]	[0.169]	[0.169]	[0.594]	[0.589]	[0.589]	[0.590]
Dividend Payer	-0.106***	-0.095***	-0.109***	-0.108***	-0.368***	-0.337***	-0.364***	-0.363***
	[0.028]	[0.028]	[0.028]	[0.028]	[0.103]	[0.103]	[0.103]	[0.103]
Tangibility	-0.086	-0.101	-0.081	-0.084	-0.013	-0.062	-0.024	-0.028
	[0.104]	[0.103]	[0.104]	[0.103]	[0.374]	[0.371]	[0.371]	[0.370]
CF Volatility	-0.048	-0.019	0.026	0.013	-0.596	-0.535	-0.481	-0.51
	[0.265]	[0.263]	[0.275]	[0.275]	[0.955]	[0.955]	[0.976]	[0.974]
RD Expenses	-0.683	-0.684	-0.727*	-0.694	-2.943*	-2.988*	-2.967*	-2.940*
	[0.439]	[0.436]	[0.441]	[0.437]	[1.734]	[1.734]	[1.746]	[1.742]
Unrated	0.024	0.02	0.031	0.029	0.03	0.019	0.024	0.02
	[0.034]	[0.034]	[0.035]	[0.035]	[0.128]	[0.128]	[0.131]	[0.130]
Book Leverage	0.395***	0.400***	0.375***	0.384***	1.539***	1.553***	1.556***	1.576***
	[0.061]	[0.060]	[0.063]	[0.063]	[0.264]	[0.262]	[0.274]	[0.271]
Constant	-0.143	0.014	-0.165	-0.124	-1.698**	-1.378*	-1.624**	-1.615**
	[0.170]	[0.176]	[0.189]	[0.187]	[0.766]	[0.780]	[0.789]	[0.780]
Observations	2531	2531	2531	2531	2447	2447	2447	2447
Pseudo R^2	0.32	0.32	0.32	0.32	0.19	0.19	0.19	0.19

Table 4.7: Inside Debt Effect on Bond Usage

This table provides analysis of bond usage given the presence of CEO inside debt. Panel A provides analysis for senior bonds. Panel B provides analysis for subordinated bonds. The dependent variables are the amount of bonds used or if bonds were used at all. All controls are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

Panel A: Senior Bonds

	Model 1 Tobit PerSBN	Model 2 Tobit PerSBN	Model 3 Tobit PerSBN	Model 4 Tobit PerSBN	Model 5 Probit SBN	Model 6 Probit SBN	Model 7 Probit SBN	Model 8 Probit SBN
CEO RDE	-0.001				0.193			
	[0.019]				[0.160]			
CEO RDE > 1		0.273**				1.469**		
		[0.139]				[0.698]		
CEO RIR			-0.034**				0.184*	
			[0.015]				[0.109]	
CEO RIRCA				-0.043***				0.217*
				[0.017]				[0.122]
Size	0.057***	0.064***	0.064***	0.063***	0.467***	0.533***	0.425***	0.431***
	[0.012]	[0.013]	[0.015]	[0.014]	[0.072]	[0.075]	[0.080]	[0.079]
CEO RDE * Size	0				-0.029			
	[0.002]				[0.022]			
CEO RDE > 1 * Size		-0.029*				-0.180*		
		[0.015]				[0.094]		
CEO RIR * Size			0.003*				-0.029**	
			[0.002]				[0.014]	
CEO RIRCA * Size				0.004**				-0.037**
				[0.002]				[0.016]
CEO Vega/Delta	0.01	0.012	-0.002	0.004	-1.378	-0.156	-1.112	-1.282
	[0.035]	[0.034]	[0.034]	[0.034]	[3.302]	[2.429]	[2.558]	[2.583]

M/B	0.003	0.003	0.007	0.005	-0.024	-0.022	-0.036	-0.04
	[0.020]	[0.020]	[0.020]	[0.020]	[0.066]	[0.068]	[0.067]	[0.067]
Profitability	-0.141	-0.157	-0.133	-0.122	-1.307*	-1.474*	-1.16	-1.092
	[0.184]	[0.186]	[0.186]	[0.186]	[0.747]	[0.764]	[0.742]	[0.747]
Dividend Payer	0.144***	0.139***	0.142***	0.140***	0.730***	0.722***	0.738***	0.733***
	[0.030]	[0.029]	[0.029]	[0.029]	[0.132]	[0.131]	[0.131]	[0.130]
Tangibility	0.108	0.118	0.119	0.119	0.626	0.687	0.619	0.617
	[0.090]	[0.090]	[0.089]	[0.089]	[0.443]	[0.432]	[0.441]	[0.439]
CF Volatility	0.244	0.244	0.302	0.301	1.097	0.928	1.014	1.068
	[0.252]	[0.257]	[0.254]	[0.256]	[1.573]	[1.589]	[1.520]	[1.518]
RD Expenses	1.312**	1.317**	1.263**	1.297**	2.7	2.718	2.545	2.5
	[0.547]	[0.545]	[0.544]	[0.551]	[1.725]	[1.740]	[1.693]	[1.691]
Unrated	-0.215***	-0.216***	-0.200***	-0.197***	-0.622***	-0.643***	-0.573***	-0.551***
	[0.037]	[0.037]	[0.036]	[0.036]	[0.151]	[0.150]	[0.152]	[0.152]
Book Leverage	0.185***	0.195***	0.137**	0.134**	1.017***	1.120***	1.045***	1.025***
	[0.063]	[0.062]	[0.063]	[0.063]	[0.350]	[0.337]	[0.357]	[0.348]
Constant	-0.268	-0.366**	-0.306*	-0.271*	-3.658***	-4.212***	-3.418***	-3.448***
	[0.171]	[0.182]	[0.168]	[0.160]	[0.682]	[0.705]	[0.723]	[0.722]
Observations	2531	2531	2531	2531	2295	2295	2295	2295
Pseudo R^2	0.41	0.41	0.41	0.42	0.44	0.44	0.44	0.44

Panel B: Subordinated Bonds

	Model 1 Tobit PerSUB	Model 2 Tobit PerSUB	Model 3 Tobit PerSUB	Model 4 Tobit PerSUB	Model 5 Probit SUB	Model 6 Probit SUB	Model 7 Probit SUB	Model 8 Probit SUB
CEO RDE	-0.006				0.009			
	[0.029]				[0.088]			
CEO RDE > 1		-0.316				-0.579		
		[0.284]				[0.699]		
CEO RIR			0.022				0.079	
			[0.026]				[0.083]	
CEO RIRCA				0.022				0.075
				[0.027]				[0.083]
Size	-0.018	-0.02	-0.038	-0.037	0.011	0.017	-0.066	-0.062
	[0.021]	[0.019]	[0.027]	[0.026]	[0.058]	[0.055]	[0.071]	[0.067]
CEO RDE * Size	0				-0.004			
	[0.003]				[0.009]			
CEO RDE > 1 * Size		0.023				0.03		
		[0.032]				[0.083]		
CEO RIR * Size			-0.003				-0.012	
			[0.003]				[0.009]	
CEO RIRCA * Size				-0.003				-0.013
				[0.003]				[0.009]
CEO Vega/Delta	-0.095*	-0.055	-0.073	-0.077	-0.322*	-0.2	-0.280*	-0.291*
	[0.053]	[0.051]	[0.048]	[0.048]	[0.172]	[0.135]	[0.149]	[0.154]
M/B	-0.100***	-0.100***	-0.104***	-0.104***	-0.205**	-0.204**	-0.210**	-0.211**
	[0.038]	[0.038]	[0.038]	[0.038]	[0.085]	[0.084]	[0.084]	[0.084]
Profitability	-0.214	-0.183	-0.205	-0.2	-0.942	-0.867	-0.897	-0.875
	[0.276]	[0.273]	[0.274]	[0.274]	[0.713]	[0.708]	[0.707]	[0.709]
Dividend Payer	-0.273***	-0.253***	-0.263***	-0.266***	-0.624***	-0.572***	-0.594***	-0.607***
	[0.054]	[0.054]	[0.053]	[0.054]	[0.129]	[0.130]	[0.127]	[0.128]
Tangibility	-0.072	-0.087	-0.072	-0.071	0.003	-0.033	0.007	0.012
	[0.207]	[0.205]	[0.209]	[0.210]	[0.536]	[0.535]	[0.536]	[0.537]

CF Volatility	-0.513	-0.536	-0.486	-0.474	-1.551	-1.628	-1.338	-1.299
	[0.720]	[0.707]	[0.693]	[0.691]	[1.944]	[1.911]	[1.843]	[1.831]
RD Expenses	1.907**	1.866**	1.913**	1.894**	2.816*	2.697	2.775*	2.7
	[0.760]	[0.754]	[0.758]	[0.759]	[1.667]	[1.658]	[1.673]	[1.684]
Unrated	-0.267***	-0.272***	-0.280***	-0.279***	-0.698***	-0.712***	-0.728***	-0.724***
	[0.066]	[0.065]	[0.068]	[0.069]	[0.179]	[0.178]	[0.185]	[0.187]
Book Leverage	0.197*	0.196*	0.213*	0.209*	0.732**	0.726**	0.720**	0.704**
	[0.119]	[0.117]	[0.121]	[0.122]	[0.313]	[0.311]	[0.314]	[0.314]
Constant	0.167	0.207	0.257	0.242	0.011	-0.007	0.413	0.375
	[0.309]	[0.296]	[0.309]	[0.299]	[0.915]	[0.902]	[0.906]	[0.886]
Observations	2531	2531	2531	2531	2257	2257	2257	2257
Pseudo R^2	0.26	0.27	0.26	0.26	0.21	0.22	0.21	0.22

usage of senior bonds. The controls are statistically significant with the same sign across all models. Thus, a lower likelihood and usage of bonds is demonstrated for larger firms who pay the CEO with a disproportionate amount of inside debt.

Panel B of Table 4.7 provides results for subordinated bonds. With respect to inside debt and size, there are no statistically significant results. From the controls I find unrated non-dividend payers with a lower market-to-book ratio and higher R&D and leverage have a higher percentage and likelihood of subordinated bonds, suggesting a capital structure heavily using debt.

Panel B of Table 4.7 provides results for subordinated bonds. With respect to inside debt and size, there are no statistically significant results. From the controls I find unrated non-dividend payers with a lower market-to-book ratio and higher R&D and leverage have a higher percentage and likelihood of subordinated bonds, suggesting a capital structure heavily using debt.

Table 4.8 provides analysis of commercial loans. Models 1 and 2 show no significance among CEO RDE, firm size, and their interaction, respectively. CEO RIR and CEO RIRCA are positive and statistically significant in Models 3 and 4, respectively. The interaction term between these inside debt variables and size is negative and statistically significant, suggesting asymmetric information leads larger firms with high inside debt to use a lower percentage of commercial loans. Non-dividend payers with low profitability and low cash flow volatility use more commercial loans. Thus, a conservative debt policy emerges through a lower usage of commercial loans.

Table 4.9 provides results of other debt, which includes trust preferred stock. In Models 1 and 5, CEO RDE is negative and significant, suggesting a higher level of inside debt leads to a

Table 4.8: Inside Debt Effect on Commercial Loan Usage

This table provides analysis of commercial loan usage given the presence of CEO inside debt. The dependent variables are the amount of commercial loans used or if commercial loans were used at all. All controls are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 Tobit PerCL	Model 2 Tobit PerCL	Model 3 Tobit PerCL	Model 4 Tobit PerCL	Model 5 Probit CL	Model 6 Probit CL	Model 7 Probit CL	Model 8 Probit CL
CEO RDE	-0.005				-0.043			
	[0.007]				[0.078]			
CEO RDE > 1		-0.037				0.188		
		[0.049]				[0.511]		
CEO RIR			0.014**				0.08	
			[0.007]				[0.067]	
CEO RIRCA				0.021***				0.143**
				[0.008]				[0.072]
Size	0.002	-0.001	-0.003	-0.003	0.104**	0.095*	0.075	0.073
	[0.005]	[0.005]	[0.006]	[0.006]	[0.048]	[0.050]	[0.057]	[0.055]
CEO RDE * Size	0.001				0.004			
	[0.001]				[0.009]			
CEO RDE > 1 * Size		0.006				0.002		
		[0.006]				[0.061]		
CEO RIR * Size			-0.001*				-0.008	
			[0.001]				[0.008]	
CEO RIRCA * Size				-0.002**				-0.013
				[0.001]				[0.008]
CEO Vega/Delta	-0.017	-0.019	-0.018	-0.018	-1.059**	-0.911***	-0.940***	-0.927***
	[0.023]	[0.026]	[0.034]	[0.032]	[0.456]	[0.323]	[0.353]	[0.354]
M/B	0.01	0.01	0.009	0.009	-0.047	-0.052	-0.059	-0.056
	[0.012]	[0.012]	[0.012]	[0.012]	[0.058]	[0.057]	[0.058]	[0.057]
Profitability	-0.241**	-0.243**	-0.233**	-0.239**	-1.588***	-1.654***	-1.585***	-1.626***

	[0.098]	[0.098]	[0.098]	[0.098]	[0.567]	[0.569]	[0.571]	[0.572]
Dividend Payer	-0.024*	-0.026*	-0.023*	-0.022*	-0.215*	-0.242**	-0.204*	-0.197*
	[0.014]	[0.014]	[0.013]	[0.013]	[0.114]	[0.115]	[0.114]	[0.113]
Tangibility	0.067*	0.068*	0.062	0.061	0.593	0.623	0.56	0.546
	[0.039]	[0.039]	[0.039]	[0.039]	[0.400]	[0.404]	[0.401]	[0.400]
CF Volatility	-0.451**	-0.442**	-0.459***	-0.465***	-3.391**	-3.258**	-3.442**	-3.509**
	[0.176]	[0.179]	[0.174]	[0.173]	[1.468]	[1.499]	[1.473]	[1.468]
RD Expenses	-0.1	-0.093	-0.092	-0.104	-0.675	-0.613	-0.572	-0.639
	[0.227]	[0.227]	[0.226]	[0.227]	[1.615]	[1.635]	[1.612]	[1.629]
Unrated	-0.008	-0.009	-0.013	-0.016	-0.165	-0.176	-0.2	-0.22
	[0.015]	[0.015]	[0.015]	[0.015]	[0.141]	[0.141]	[0.143]	[0.143]
Book Leverage	-0.035	-0.032	-0.017	-0.011	0.4	0.467*	0.542*	0.604**
	[0.033]	[0.033]	[0.033]	[0.032]	[0.280]	[0.274]	[0.288]	[0.286]
Constant	-0.092	-0.063	-0.06	-0.075	-1.705**	-1.664*	-1.570*	-1.651*
	[0.076]	[0.081]	[0.088]	[0.090]	[0.863]	[0.877]	[0.910]	[0.937]
Observations	2531	2531	2531	2531	2458	2458	2458	2458
Pseudo R^2	0.67	0.68	0.68	0.7	0.16	0.16	0.16	0.16

Table 4.9: Inside Debt Effect on Other Debt Usage

This table provides analysis of other debt usage given the presence of CEO inside debt. The dependent variables are the amount of other debt used or if other debt was used at all. All controls are lagged. See the Appendix for variable definitions. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 Tobit PerOTHER	Model 2 Tobit PerOTHER	Model 3 Tobit PerOTHER	Model 4 Tobit PerOTHER	Model 5 Probit OTHER	Model 6 Probit OTHER	Model 7 Probit OTHER	Model 8 Probit OTHER
CEO RDE	-0.017*				-0.152**			
	[0.010]				[0.072]			
CEO RDE > 1		0.06				1.153**		
		[0.076]				[0.537]		
CEO RIR			-0.008				-0.02	
			[0.009]				[0.092]	
CEO RIRCA				-0.008				-0.019
				[0.009]				[0.092]
Size	0.058***	0.056***	0.067***	0.066***	0.421***	0.452***	0.422***	0.426***
	[0.008]	[0.007]	[0.009]	[0.009]	[0.056]	[0.054]	[0.060]	[0.055]
CEO RDE * Size	0.002*				0.017**			
	[0.001]				[0.008]			
CEO RDE > 1 * Size		-0.005				-0.142**		
		[0.009]				[0.067]		
CEO RIR * Size			0.002				0.004	
			[0.001]				[0.011]	
CEO RIRCA * Size				0.002				0.005
				[0.001]				[0.011]
CEO Vega/Delta	0.012	0.012	0.020**	0.020**	0.444	0.973*	1.030*	1.045*
	[0.008]	[0.012]	[0.009]	[0.008]	[0.343]	[0.578]	[0.600]	[0.595]
M/B	-0.008	-0.008	-0.008	-0.007	-0.067	-0.068	-0.072	-0.07
	[0.010]	[0.010]	[0.010]	[0.010]	[0.067]	[0.066]	[0.067]	[0.067]
Profitability	-0.132	-0.131	-0.146	-0.15	-0.532	-0.565	-0.595	-0.617

	[0.098]	[0.096]	[0.098]	[0.099]	[0.624]	[0.621]	[0.615]	[0.616]
Dividend Payer	-0.019	-0.021	-0.02	-0.018	0.025	0.02	0.026	0.029
	[0.018]	[0.018]	[0.018]	[0.018]	[0.108]	[0.110]	[0.108]	[0.108]
Tangibility	0.032	0.033	0.03	0.03	-0.203	-0.241	-0.24	-0.241
	[0.054]	[0.054]	[0.055]	[0.055]	[0.378]	[0.384]	[0.382]	[0.383]
CF Volatility	0.183	0.192	0.171	0.17	0.162	0.291	0.213	0.204
	[0.156]	[0.156]	[0.164]	[0.164]	[0.943]	[1.024]	[1.000]	[1.003]
RD Expenses	-0.621**	-0.607**	-0.612**	-0.606**	-5.690***	-5.887***	-5.680***	-5.691***
	[0.263]	[0.262]	[0.264]	[0.264]	[1.762]	[1.768]	[1.770]	[1.771]
Unrated	0.031	0.03	0.031	0.031	-0.157	-0.153	-0.161	-0.16
	[0.022]	[0.022]	[0.022]	[0.022]	[0.131]	[0.130]	[0.131]	[0.131]
Book Leverage	0.148***	0.155***	0.163***	0.163***	0.503*	0.589**	0.610**	0.621**
	[0.045]	[0.044]	[0.046]	[0.046]	[0.285]	[0.278]	[0.293]	[0.289]
Constant	-0.580***	-0.570***	-0.618***	-0.616***	-3.123***	-3.401***	-3.152***	-3.196***
	[0.115]	[0.114]	[0.111]	[0.109]	[0.603]	[0.611]	[0.618]	[0.598]
Observations	2531	2531	2531	2531	2473	2473	2473	2473
Pseudo R^2	0.77	0.77	0.78	0.78	0.26	0.26	0.26	0.26

lower usage and likelihood of other debt. The interaction between CEO RDE and firm size is positive and significant in both models, suggesting asymmetric information leads larger firms with higher levels of CEO inside debt to diversify by using other types of debt. CEOs with a larger Vega-to-delta ratio have a positive association with other debt. Firms with lower research and development expenses and higher book leverage have a higher usage and likelihood of other debt. Future research can delve more into the components of other debt to see if items like trust preferred stock have an effect on a firm's financial policy.

Two other topics of interest related to debt instruments are interest rates and maturity. Table 4.10 provides results concerning debt interest rates[33]. Model 1 has no significance among CEO RDE, firm size, and their interaction, respectively. In model 2, for firms who pay their CEOs with more debt than what is theoretically optimal (CEO RDE > 1), I find a significant positive association with higher interest rates at a 5% level. A statistically weaker result is demonstrated with CEO RIR and CEO RIRCA in Models 3 and 4, respectively. The interaction between inside debt and size is negative and significant in three models, suggesting larger firms who incentivize CEOs with relatively more inside debt have a lower weighted average cost of debt capital. Firms with a high market-to-book ratio, lower profitability, and lower cash flow volatility have higher interest rates.

Maturity is analyzed in Table 4.11. Models 1 and 2 show a significant negative relationship between average debt maturity and firm size at the 5% level. I find higher inside debt is positively related to higher maturity of debt issues in Models 3 and 4 with CEO RIR and CEO RIRCA, respectively. This effect is significant at the 1% level for the level of inside debt

[33] The data for this regression is 80% smaller compared to other models due to the lack of interest rate data available in Capital IQ.

Table 4.10: CEO Inside Debt and Debt Interest Rates

This table provides OLS regressions of interest rates on debt given the presence of CEO inside debt. The dependent variable is the natural log of the weighted average interest rate on all debt issues. See the Appendix for variable definitions. All controls are lagged. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 OLS Interest	Model 2 OLS Interest	Model 3 OLS Interest	Model 4 OLS Interest
CEO RDE	0.178			
	[0.141]			
CEO RDE > 1		2.651**		
		[1.122]		
CEO RIR			0.286*	
			[0.160]	
CEO RIRCA				0.340*
				[0.194]
Size	0.029	0.119	-0.072	-0.069
	[0.082]	[0.082]	[0.116]	[0.111]
CEO RDE * Size	-0.014			
	[0.012]			
CEO RDE > 1 * Size		-0.249**		
		[0.124]		
CEO RIR * Size			-0.025*	
			[0.014]	
CEO RIRCA * Size				-0.031*
				[0.017]
CEO Vega/Delta	0.166	0.19	0.118	0.145
	[0.223]	[0.230]	[0.230]	[0.227]
M/B	32.217**	18.647**	22.209**	21.624**
	[14.479]	[9.045]	[9.290]	[9.404]
Profitability	-3.747**	-3.837**	-3.782**	-4.052**
	[1.828]	[1.861]	[1.880]	[1.893]
Dividend Payer	0.043	-0.038	0.141	0.168
	[0.328]	[0.325]	[0.322]	[0.337]
Tangibility	0.921	1.021	0.849	0.913
	[0.681]	[0.695]	[0.689]	[0.693]
CF Volatility	-5.222**	-5.440**	-6.410**	-6.362**
	[2.183]	[2.100]	[2.478]	[2.481]
RD Expenses	-5.044	-5.426	-4.272	-4.263
	[4.898]	[4.754]	[4.865]	[4.900]
Unrated	-0.333	-0.267	-0.451	-0.432
	[0.274]	[0.277]	[0.288]	[0.286]
Book Leverage	0.564	0.648	1.003*	1.086*
	[0.549]	[0.533]	[0.581]	[0.625]
Constant	-0.005	-0.681	0.589	0.507
	[0.777]	[0.797]	[0.941]	[0.903]
Observations	590	590	590	590
R^2	0.32	0.33	0.33	0.33

Table 4.11: CEO Inside Debt and Debt Maturity

This table provides OLS regressions of debt maturity given the presence of CEO inside debt. The dependent variable is the natural log of the weighted average length of time to maturity on all debt issues. See the Appendix for variable definitions. All variables are lagged. Industry fixed effects at the 2-digit SIC level and year fixed effects are included in all models. Heteroskedastic-robust standard errors with firm clustering are in brackets. Significance is depicted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Model 1 OLS Maturity	Model 2 OLS Maturity	Model 3 OLS Maturity	Model 4 OLS Maturity
CEO RDE	-0.021			
	[0.042]			
CEO RDE > 1		-0.539		
		[0.396]		
CEO RIR			0.079**	
			[0.034]	
CEO RIRCA				0.105***
				[0.037]
Size	-0.072**	-0.088**	-0.099**	-0.093**
	[0.034]	[0.035]	[0.042]	[0.039]
CEO RDE * Size	0.002			
	[0.005]			
CEO RDE > 1 * Size		0.053		
		[0.044]		
CEO RIR * Size			-0.007**	
			[0.004]	
CEO RIRCA * Size				-0.010**
				[0.004]
CEO Vega/Delta	0.04	0.037	0.031	0.036
	[0.050]	[0.049]	[0.050]	[0.049]
M/B	-0.005	0.018	0.042	0.032
	[0.062]	[0.065]	[0.063]	[0.063]
Profitability	0.742	0.765	0.74	0.692
	[0.531]	[0.530]	[0.532]	[0.530]
Dividend Payer	-0.004	0.015	0.007	0.012
	[0.076]	[0.078]	[0.076]	[0.076]
Tangibility	0.218	0.193	0.19	0.187
	[0.223]	[0.219]	[0.221]	[0.220]
CF Volatility	0.158	0.185	0.071	0.056
	[0.476]	[0.481]	[0.484]	[0.481]
RD Expenses	-3.588**	-3.602**	-3.533**	-3.598**
	[1.533]	[1.534]	[1.559]	[1.559]
Unrated	0.365***	0.360***	0.329***	0.319***
	[0.092]	[0.092]	[0.096]	[0.096]
Book Leverage	-0.394**	-0.394***	-0.275*	-0.258
	[0.153]	[0.150]	[0.165]	[0.162]
Constant	5.546***	5.672***	5.787***	5.749***
	[0.271]	[0.263]	[0.309]	[0.293]
Observations	2451	2451	2451	2451
R^2	0.19	0.19	0.19	0.2

incentives after adjusting for cash compensation, and it is significant at the 5% level for inside debt incentives only. Thus, firms with higher inside debt are more likely to have longer maturity on their debt issues. Thus, I conclude CEOs paid with higher amounts of inside debt cater, on average, to debt holders through the channels of yield and maturity. However, once one considers size, the effect is mitigated. Size is negative and significant at the 5% level in all specifications. Models 3 and 4 show the interaction between inside debt and size is negative and significant, suggesting firms with higher asymmetric information utilize it to achieve shorter maturities on the debt portion of their capital structure. Unrated firms with lower R&D and lower leverage have longer maturities.

4.5. Robustness

Cassell et al. (2012) and Cen (2011) test for the endogeneity of inside debt using IVs such as industry medians of inside debt, tax status, executive personal wealth, and state tax rate. I run instrumental variable (IV) regressions for Table 4.2. In the first stage I include the industry median of inside debt, CEO age, an indicator if the CEO is new, total assets, market-to-book ratio, an indicator if the firm has a positive tax carry-forward, and the state tax rate. I then use the predicted value of the inside debt variables in the second stage where all controls are used. In unreported results, I am unable to reject the null from the Wald test of exogeneity, suggesting my previous models are preferred over IV regressions. I also use panel techniques to show the results are further robust to model specification. In unreported results, I use Tobit and Probit random effects and OLS fixed effects and find similar results to the main findings.

Another concern is the calculation of the inside debt ratio. Is the CEO leverage or firm leverage driving the results? In unreported results, I test all regressions by including a leverage

indicator if it is greater than one. Only one model has both CEO RDE > 1 and Leverage > 1 as significant, but the magnitude, direction, and significance are the same for both.

4.6. Conclusion

Both CEO compensation structure and firm capital structure are important factors in other firm decisions. Companies who pay CEOs later use a few specific types of debt holdings. These firms are more likely to use a small portion commercial paper and term loans together, but they are less likely to combine drawn credit lines, term loans, or senior bonds with subordinated bonds. These companies tend to use more capital leasing but less term loans or bonds, regardless of seniority. These firms tend to pay higher interest rates and have debt outstanding for longer periods of time. Future research can further breakdown the structure of CEO compensation and debt along with equity.

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APPENDIX

VARIABLE	Definition
HHI	Herfindahl-Hirschman index of debt type usage
EXCL90	Colla et al. (2013) indicator if a firm has more than 90% of debt in one type
CP	Commercial paper
DC	Drawn credit line
TL	Term loans
SBN	Senior bonds and notes
SUB	Subordinated bonds and notes
CL	Capital leases
OTHER	Other debt and total trust-preferred stock
PERCP	Percentage of commercial paper used by the firm
PERDC	Percentage of drawn credit line used by the firm
PERTL	Percentage of term loans used by the firm
PERSBN	Percentage of senior bonds and notes used by the firm
PERSUB	Percentage of subordinated bonds and notes used by the firm
PERCL	Percentage of capital leases used by the firm
PEROTHER	Percentage of other debt and total trust-preferred stock used by the firm
INTEREST	Natural log of the weighted average interest rate on all debt issues
MATURITY	Natural log of the weighted average length of time to maturity on all debt issues
CEO RDE	$\frac{pension_{value_{tot}} + defer_{balance_{tot}}}{shrown_{excl_{opts}} * prccf + \left(opt_{exer_{val}} + opt_{unex_{exer_{est_{val}}}} + opt_{unex_{unexere}}\right.} \Big/ \frac{dltt + dlc}{csho * prccf}$
CEO RDE > 1	Natural log of the CEO's inside debt to the firm's debt established by Cassell et al. (2012), where the CEO has debt in the form of pension benefits and deferred compensation and equity in the form of stock and stock options (valued by Black-Scholes (1973) and the firm has current liabilities and long-term debt and equity valued as the total number of common shares outstanding multiplied by the current market price at the end of the fiscal-year

CEO RIR	$\frac{\frac{pension_{value_{tot}} + defer\_balance_{tot}}{shrown_{excl_{opts}} * prccf + \sum_1^3 delta_i * \ option\ type_i}}{\frac{dltt + dlc}{optosey * optprcby}}$
	Natural log of the CEO relative incentive ratio established by Wei and Yermack (2011), where the CEO has debt in the form of pension benefits and deferred compensation and equity in the form of stock and stock options (valued according to option delta by exercisability tranches using Black-Scholes (1973)) and the firm has current and long-term debt and equity options (valued by total employee options, the average outstanding exercise price, and assumed expiration of 4 years). I = 1 to 3 for each type of option (exercised, unexercised exercisable, and unexercised unexercisable), optosey is the total number of employee options, and optprcby is the average exercise price.
CEO RIRCA	CEO RIR adjusted to include the present value of expected future cash compensation, which is computed by estimating the CEO expected decision horizon (Industry median tenure – CEO tenure + industry median age – CEO age) x the current level of cash compensation, with pensions and deferred compensation as inside debt
Profitability	Operating income before depreciation / total assets
Tangibility	Net property, plant, and equipment / total assets
M/B	(Stock price x Common shares used to calculate earnings per share + debt in current liabilities + long-term debt + preferred stock liquidating value – deferred taxes and investment tax credit) / total assets
Size	Natural log of total assets
Dividend Payer	Indicator if common stock dividends are positive
RD Expenses	Research and development expenses / total assets
Unrated	Indicator if the firm is not rated by S&P
CF Volatility	Standard deviation of quarterly operating income over previous 12 quarters / total assets
Book Leverage	Assets less equity scaled by assets

CHAPTER 5

CONCLUSION

Does executive compensation matter in incentivizing CEOs to achieve firm goals? We find that the answer is still affirmative. We find CEOs who wait on exercising their stock options or who buy more of their own company's stock contribute to higher participation in directorships and board committees outside of their own firms, and they tend to pick CEOs similar in nature to themselves and pay them more. CEOs who have a higher proportion of their compensation coming from stocks and stock options that are granted but cannot be exercised until three to five years later exhibit more conservative behavior with regards to investment, specifically, a merger or acquisition. CEOs with higher long-term incentive pay are less likely to merge or acquire another company, but if they do, the company is more likely to be a relative smaller company in the same industry. To mitigate liquidity concerns, they acquire this firm with stock. Another type of compensation a company may use to suggest more conservative behavior is inside debt, or deferred and retirement compensation from defined benefit plans. With respect to financial policy, larger firms who pay CEOs with more inside debt have a diversified debt capital structure that pays, on average, lower yields for shorter maturities.

Overall, we suggest overconfidence affects many business decisions from the top down; overconfidence is more popular in the business community and can lead to riskier decision-making with regards to CEO pay and quicker decisions after a CEO turnover. Long-term incentive payouts and inside debt can potentially mitigate the potential of a CEO's overconfidence by forcing him to be more conservative; otherwise, he will not receive the full package of

compensation benefits. Thus, the amount and types of compensation incentives should be considered by investors making decisions about bond and stock purchases and for researchers to consider in corporate finance.