CORPORATE CASH HOLDINGS, FIRM PERFORMANCE, AND CEO COMPENSATION

by

DHRUBA BANJADE

Presented to the Faculty of the Graduate School of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT ARLINGTON
August 2020

ACKNOWLEDGEMENTS

First, I would like to express my love and gratitude to my wife Pratima and my daughter Prisha for their support and unconditional love during this academic journey.

My sincere appreciation goes to my Dissertation Supervisor, Dr. Diltz, who always encouraged me to identify new research ideas. Dr. Diltz was always available and provided me with valuable suggestions. I am also thankful to Dr. Sarkar and Dr. Yasar for providing me advice and feedback during my research.

I want to thank Dr. Sabherwal, Dr. Venkataraman, Dr. Sarkar, Dr. Villupuram, Dr. Adams, Dr. Yasar, and Dr. Jordan, and Dr. Smallwood for their support and encouragement during my doctoral studies. I also would like to thank my family and friends who supported me during my entire doctoral studies.

I am thankful to the College of Business and the Department of Finance and Real Estate for providing the research facilities, administration assistance, and financial support. I am grateful to Ms. Ruthie Brock, who helped me during ESG related data collection.

Finally, I would like to dedicate this dissertation to my father, Yog Prasad Banjade, and my late mother, Rukmini Banjade. My father always encourages and supports me in all my endeavors. My mother was a constant source of inspiration for my life. I always feel her presence that gives me strength and energy to achieve my goals.

July 10th, 2020

ABSTRACT

CORPORATE CASH HOLDINGS, FIRM PERFORMANCE, AND CEO COMPENSATION

DHRUBA BANJADE, PhD

The University of Texas at Arlington, 2020

Supervising Professor: Dr. John D. Diltz

The dissertation consists of three essays. The first essay investigates the relationship between corporate cash holdings and firm performance in new and old economy firms. Results show that firm performance increases when they maintain cash balances at or slightly above a certain level (optimum level). However, their performance degrades if they hold cash at levels beyond the optimum. Furthermore, I find that new economy firms hold more cash relative to their old economy counterparts. Corporate governance and balanced board structure also impact cash holdings and firm performance. I find that as institutional ownership increases, firm performance increases due to better monitoring.

Fair board structure policy helps to minimize agency problems. Firms that have a diversity policy tend to hold less cash. Firm performance was better for firms that held excess cash balances during the financial crisis period (2007-2009). Firm performance decreases with excess cash holdings beyond the optimum during regular economic circumstances.

The second essay examines the impact of cash holdings on CEO compensation. Results show that CEO compensation is higher when the firm holds greater cash reserves. I also find a positive relationship between CEO total compensation and firm performance. However, their benefit decreases when firms hold excess cash. I find that CEO compensation is higher in new economy firms than old economy firms. I also examine the relationship between a balanced board

structure policy and CEO compensation, and I find a negative correlation between board diversity policy and CEO total compensation.

The third essay examines the impact of ESG (Environmental, Social, and Governance) and ESG controversy scores on firm performance, cash holdings, and CEO compensation. I find a positive relationship between CEO compensation and ESG scores. For the new economy firms, firm value increases by 1.81% if they improve their ESG scores by 1% during the financial crisis period.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE
INTRODUCTION

Corporate cash holdings are increasing worldwide. Cash balances double approximately every five years, with aggregate cash holdings rising by 10% from 2015 ($1.7 trillion) to 2016 ($1.9 trillion). A growing body of research surrounds the relationship between corporate cash holdings and firm performance. The topic is relevant because cash holdings provide financial flexibility that facilitates planned events and manages unplanned events. Further, cash works as a buffer during unexpected adverse shocks in the future, especially when external financing becomes uncertain and costly.

Very few studies have examined excess cash holdings and firm value in new and old economy firms. Chen (2008) analyzes the relationship between corporate governance and cash holdings in new and old economy firms. Chen used CEO ownership and board independence as a proxy for corporate governance. He concludes that board independence can increase information transparency that helps to minimize agency problems.

What happens if firms hold significantly more cash than optimal? I examine the impact of excess cash holdings on firm value in new and old economy firms. Carrying "too much" capital may negatively affect the firm, and it may even be a negative signal. Investors may ask why excess money is not returned to shareholders as dividends, invested in attracting capital investment projects, or used in stock buybacks. As a result, agency problems may arise.

Firms in software and services, computer, internet and communication, entertainment, and media industries do not require the same levels of spending as capital-intensive "old economy" firms. The resulting success of these firms may generate extensive inventories of cash. Debate

continues about whether excess cash benefits the firm by giving managers greater flexibility on the one hand or increasing agency problems.

This dissertation extends the existing literature on cash holdings and firm value by examining the impact of excess cash beyond the optimum level on firm value in new and old economy firms. One significant contribution, especially in the first essay, is examining the impact of cash holdings (more than the optimum level) on new and old economy firms. The governance structure is especially relevant here, and I use the total institutional ownership as a proxy for corporate governance.

The second essay studies the impact of cash holdings on CEO compensation in new and old economy firms. Liu and Mauer (2011) examine the effects of CEO pensions and deferred compensation on firm cash holdings and firm value. They find a positive relationship between CEO compensation and cash holdings. To the best of this author's knowledge, CEO compensation in new and old economy firms has never been explored. The second essay helps to fill this gap in the literature by examining the impact of shareholder voting rights on executive pay and firm performance.

The third essay examines the impact of FactSet Environmental, Social, and Governance scores (ESG) and ESG controversy scores on firm value and CEO compensation. The ESG score measures the firm's commitment and effectiveness across ten sociopolitical areas (resource use, emission reduction, environmental product innovation, workforce, human rights, community, product responsibility, management, shareholders, and CSR strategy scores).

Socially conscious investors and shareholders screen investments and assess a company's impact on the world. Furthermore, socially conscious consumers prefer products and services produced by socially responsible firms. Embedding ESG factors into an investing strategy can

accomplish the dual mandate of delivering value and aligning with investor values (Leola Ross, Director, Investment Strategy, and Research (2018)). Very few researchers examined the impact of ESG scores on firm performance.

Sustainable development has become a significant concern for investors, creditors, customers, government, and environmental agencies. Motivated by this concern, I examine the impact of ESG scores on non-financial U.S. firms' value from 2002 through 2016. This research examines the impact of ESG and ESG controversy scores on firm value in new and old economy firms.

There are mainly three contributions. First, I study the impact of excess cash holdings in new and old economy firms. I find that firm performance degrades if they hold excess cash (above to optimum level). Second, I study the impact of balanced board diversity, and shareholder voting rights on executive pay, CEO compensation, and firm performance. Third, I explore the effect of ESG and ESG controversy scores on firm value and CEO compensation in new and old economy firms. Overall, my work supports the strategic rule of holding cash in moderation, while devoting significant resources to environmental protection and sustainable development.

The dissertation consists of five chapters. The first is an introduction, and the fifth chapter is a conclusion. Chapters 2,3, and 4 discuss three essays. Each essay consists of reviewing literature review and hypothesis development, research design, sample and data, and data analysis. Overall, this study focusses on the role of cash in the modern world.

References

Chen, Yenn-Ru. "Corporate governance and cash holdings: Listed new economy versus old economy firms." *Corporate Governance: An International Review* 16.5 (2008): 430-442.

Liu, Yixin, and David C. Mauer. "Corporate cash holdings and CEO compensation incentives." *Journal of financial economics* 102.1 (2011): 183-198.

CHAPTER TWO

EXCESS CASH HOLDINGS AND FIRM PERFORMANCE IN NEW AND OLD ECONOMY FIRMS

2.1 Introduction

The firm's cash holding consists of cash and cash equivalents that may be readily converted to cash (Amarjit Gill, Charul Shah, 2012). Motives for holding large amounts of money include the transaction motive (for conducting normal business operations), the precautionary motive (for unforeseen circumstances requiring payment), and the speculative motive (to exploit profitable opportunities). Cash inflows and outflows can by and large be anticipated, but there may be variations due to the random nature of financial, commodity, and labor markets. Sometimes cash remains idle, in which case firms incur an opportunity cost in the form of lost interest income. However, if there is an urgent need for liquidity, cash strapped firms may incur high charges.

Firms hold a certain amount of cash to exploit undervalued opportunities. These opportunities appear randomly. Raw materials prices may not move in the direction the firm anticipates. (https://www.spglobal.com/en/research-insights/articles/US-Corporate-Cash-Reaches-19-Trillion-But-Rising-Debt-and-Tax-Reform-Pose-Risk).

Excess cash is extra cash that the firm generates after discharging its financial obligations. Financial obligations include rent payments, raw materials purchases, payroll, dividends, and more. I estimate the excess cash for any firm j as the residual of the following cross-sectional regression:

$$Cash_{i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 Lev_{i,t} + \beta_3 R\&D_{i,t} + \beta_4 NWC_{i,t} + \beta_5 Div_{i,t} + \beta_6 MTB_{i,t} + \beta_7 CF_{i,t} + \beta_8 Industry\ Sigma_{i,t} + \beta_9 REG_{i,t} + \varepsilon_{i,t} \quad \text{.....1}$$

Following Huang and Manzouz (2018), I define the variable cash as the ratio of cash holdings to total assets. The binary variable REG refers to regulated industries.

Following Barclay and Smith (1995), regulated industries are railroads (SIC code 4011), trucking (Sic Codes 4210 and 4213), airlines (Sic code 4512), and telecom (Sic codes 4812 and 4813). Industry sigma is cash flow risk, defined as the mean of the ratio of the standard deviations of cash flows to total assets over 20 years for firms in the same industry defined by two digits SIC code.

The control variables are motivated by the transaction and precautionary motives for corporate cash holdings. They include:

i. Firm size: The logarithm of (1+market value of the equity).

ii. Leverage: Long-term debt plus debt in current liabilities divided by total assets. If the debt becomes problematic, firms will use cash to reduce leverage. Thus, we anticipate a negative relationship between cash holdings and leverage. However, Acharya, Almedia, and Campello (2007) find a consistent positive relationship.

iii. Capital expenditures to sales: Capital expenditure creates assets that can be used as collateral. It may increase debt capacity and reduce the demand for cash. As firms invest more, cash reserves are depleted. At the same time, capital expenditure represents an investment opportunity, which, in turn, generates cash flow.

iv. Networking capital to assets: Networking capital (NWC) consists of assets that substitute for cash. I thus expect a negative relation between NWC and cash holdings. Net working capital is defined as the difference between current assets and current liabilities. Working capital management is managing company's existing assets and liabilities (Schall and Haley 1991).

v. Cash flow to assets: Firms with higher cash flow hold more cash (Bates, Thomas et al. (2009). Such firms may have better investment opportunities. Thus, we expect a positive relationship between cash flow and cash holdings.

vi. R&D to sales: R&D to sales measures growth opportunities. Firms with higher R&D are considered more susceptible to financial distress.

vii. Acquisition to assets: Acquisition expenditures reflect cash outflows. We expect a negative relation between the cash holdings and acquisitions.

viii. Dividend dummy: Dividend equals to one if the firm pays an ordinary dividend on a given year and zero otherwise. Firms that pay dividends are considered less risky and have greater access to the capital markets. Thus, firms that pay dividends must hold less cash, and vice versa.

ix. Institutional ownership: This variable is the total institutional ownership as a percentage of market capitalization. Elyasiani, Elyas, and Jingyi Jia (2010) find a positive relationship between institutional ownership stability and firm performance.

2.2 Literature Review and Hypothesis Development

The trade-off theory explains that the firm compares the benefits and costs associated with holding cash. According to Ferreira and Vilela (2004), firms hold cash to minimize future financial distress. Furthermore, cash-rich firms can take a competitive advantage with money in hand. Firms paying high dividends are perceived to be less risky, experiencing low agency costs and information asymmetry (Jensen 1986). Jensen and Meckling (1976) argue that managers have greater control over large firms where the shareholder base is diffuse and thus an inability to adequately monitor. The level of agency problems and information asymmetry intensifies.

According to Fresard, Laurent (2010), excess cash reserves lead to systematic future market share gains at the expense of industry rivals.

2.2.1. Firm Performance

Productivity problems may arise, raw materials price may go up, and these activities may create a cash flow imbalance. Firms can minimize the effects of these adverse events by holding cash. A positive shock boosts the firms' productivity. If an unwanted event occurs, cash flow disturbances are likely to follow. For both scenarios, firms need resources to invest. Bates, Kahle, and Stulz (2009) argue that the precautionary motive is one of the essential reasons for holding cash.

Hypothesis 1: *Firm value (measured as Tobin's q) is positively (negatively) and associated with cash holdings to total assets when the cash holdings to total assets are below (above) the optimum value.*

Here, the defined standard value (also called optimum value) is the level of cash holding consistent with firm value maximization. When cash holding is below this standard, firm value (measured as Tobin's q) becomes positive. Martinez-Sola et al. (2013) study the impact of cash holdings on firm value (Tobin's Q) for the US industrial firms for the period 2001 to 2007. Authors find that there exists an optimum level of cash holdings for the maximum firm value.

Let us consider Vit (firm's value –Tobin's Q) equals Y, and cash equals X. Then, we can write

$$Y= \beta_0 + \beta_1 X + \beta_2 X^2$$

Differentiate both sides with respect to X, we get

$$Dy/dx = 0+\beta_1 + 2\beta_2 X$$

For maximum or minimum value, we set dy/dx =0. Then,

$$\beta_1 + 2\beta_2 X = 0$$

$$X = -\beta_1/2\beta_2$$

Again $d^2y/dx^2 = 2\beta_2$,

d^2y/dx^2 is negative since $\beta_2 < 0$.

Since β1 is positive, and β2 is negative, X is positive. It gives the optimal level of cash for maximum firm value. To check whether the firm value is maximum or minimum, we perform second derivatives. Negative d^2y/dx^2 shows that the firm performance degrades as the firms hold cash more than the absolute amount (Optimum level).

Hypothesis 2: *New economy firms hold more cash than old economy firms.*

Here, the dependent variable is cash. New economy firms like technological firms, computers, software-related firms, etc. are always threatened by their competitors. If they cannot update their products in a timely fashion, they may lose market share. If they cannot compete with an efficient competitor, they may have to lose a lot of money. So, these firms hold more cash to spend when they need to spend on new projects.

2.2.2 Institutional Ownership and Cash Holding

Institutions generally buy large blocks of a company's outstanding shares and exert considerable influence upon its management. Thus, we can use total institutional ownership as a proxy for corporate governance. Sizeable institutional ownership provides positive signals for investors. As a result, it can increase the stock price considerably. However, institutional selloffs are a negative sign. The poor performance of any firm may be due to poor management. Yenn-Ru-Chen (2008) examines the impact of corporate governance on firms' cash-holding policies with different investment opportunities. They find that CEO ownership and board independence affect cash holdings differently in new and old economy firms. Pinkowitz, Stulz, and Williamson (2006)

confirm that the relation between cash holdings and firm value is much weaker in countries with poor corporate governance.

Gompers, Ishii, and Metrick (GIM) examine the impact of corporate governance on firm performance during the 1990s. They find that stock returns are positively associated with substantial shareholders' rights. However, Core, Guay, and Rusticus (2006) argue that stock returns are not positively correlated with shareholders' rights. Shleifer and Vishny (1997) argue that the legal protection of investors' rights is a critical proxy for corporate governance. Furthermore, the authors also find that significant shareholdings, takeovers, and bank financing are practical tools to mitigate agency problems. Higher institutional ownership indicates better governance because institutions are more likely to be active shareholders (Boris Nikolov and Toni M. Whited,2014).

Hypothesis 3: *Firms hold more (less) cash when the corporate governance mechanism is weak (robust).*

Corporate governance is the system of rules, regulations, practices, and processes by which a firm is directed and controlled. We use total institutional ownership as a percentage of market capitalization as a proxy for corporate governance. Hartzell and Starks (2003) study institutional investors and executive compensation. Institutional ownership and active monitoring are correlated. Firms maintain better transparency and suitable governance mechanisms when institutional investors exercise effective control.

Carter, David A et al. (2003) studied the relationship between board diversity and firm value for Fortune 1000 firms. They define board diversity as the percentage of women, African Americans, Asians, and Hispanics. The authors find significant and positive relationships between the fraction of women or minorities on the board and firm value, measured by Tobin's Q. Canyon and He (2017) find a positive effect on women's presence on board.

Furthermore, the authors find that the positive impact is more significant on high-performing firms than low-performing firms. Atif et al. (2019) examine the impact of board gender diversity on corporate cash holdings. They find a negative relationship between board gender diversity and corporate cash holdings for the S&P 1500 index from 2006 to 2015. The result is indicative of consistent and robust monitoring.

2.3 Data and Variable Descriptions

I obtain firms' financial characteristics from COMPUSTAT and executive compensation data from EXECUCOMP for the period 2000 through 2016, with annual frequency. The database covers roughly 1,500 firms, including the 500 firms in the S&P 500 index, the 400 firms in the S&P Mid-cap Index, and the 600 firms in the S&P Small-cap Index. I obtain information on institutional holdings from the Thomson-Reuters Institutional Holdings (13F) Database. To reduce the influence of outliers, I Winsorize all variables at their 1st and 99th percentiles. We also exclude utilities (SIC codes 4900 – 4949) and financial firms (Sic codes 6000 – 6999). Distressed firms with negative assets or negative book equity are also removed from the sample. I exclude observations with missing values for total assets, market value, and cash from the final sample. All variables are defined in Appendix A.

2.4 Research Design

We estimate the following regression equation to test hypothesis 1.

$$V_{i,t} = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 {Cash_{i,t}}^2 + \beta_3 Intangible_{i,t} + \beta_4 Size_{i,t} + \beta_5 Lev_{i,t} +$$

$$\beta_6 {leverage_{i,t}}^2 + \beta_7 R\&D_{i,t} + \beta_8 NWC_{i,t} + \beta_9 Div_{i,t} + \beta_{10} CAPX_{i,t} + \beta_{11} Acquisition_{i,t} +$$

$$\beta_{12} CF_{i,t} + \beta_{13} Sigma_{i,t} + \beta_{14} Age_{i,t} + \beta_{15} Gender_{i,t} + \beta_{16} Ownership_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where the dependent variable (V_{it}) is the firm value (Tobin's Q). $\varepsilon_{i,t}$ *is the error term.* I expect positive β_1 and negative β_2.

I estimate the following regression equation to test hypothesis 2 and 3.

$$Cash_{i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 Lev_{i,t} + \beta_3 R\&D_{i,t} + \beta_4 NWC_{i,t} + \beta_5 Div_{i,t} + \beta_6 CAPX_{i,t} + \beta_7 Acquisition_{i,t} + \beta_8 CF_{i,t} + \beta_9 Sigma_{i,t} + \beta_{10} Age_{i,t} + \beta_{11} Gender_{i,t} + +\beta_{12} New_{i,t} + \beta_{13} Ownership_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

I assume that the larger the total institutional ownership, the better the monitoring and corporate governance mechanisms. The control variables are firm size, leverage, R&D expense, net working capital, dividend dummy, capital expenditures, CEO ago, cash flow, cash flow volatility, CEO gender, and New Economy firms. New Economy is the dummy variable etc. New economy firms are those with SIC codes 3570, 3571, 3572, 3576, 3577, 3661, 3674, 4812, 4813, 5045, 5961, 7370,7371, 7372, and 7373. Old economy firms have SIC codes less than 4000 (not otherwise defined) (Murphy (2003)).

Cash holdings are lower for more substantial firms due to economies of scale. Thus, we expect a positive insignificant, or negative coefficient on it. Networking capital is defined as working capital minus cash and marketable securities. NWC controls the possibility that other liquid assets may substitute for money (Ozkan &Ozkan, 2004). So, we expect a negative coefficient on it. Opler et. Al (1999) argues that capital expenditures (capital expenditures to total assets) can be used as a proxy for investment opportunities. Firms can use cash holdings to minimize their debt. Thus, we can expect a negative coefficient on leverage. The dividend is a dummy variable equal to one if firms issue dividends, and zero otherwise. Firms who pay dividends regularly are less risky and hold less cash. We can expect a negative coefficient on it. Research and development expenditures control for growth opportunities. Firms with more significant R & D expenditures have higher growth opportunities and hold more cash to avoid forgoing real valuable options.

2.5 Result Analysis

2.5.1 Univariate Results

Table I. Descriptive Statistics. Table 1 reports the descriptive statistics of the main variables used in our analysis. The sample covers the period from 2000 to 2016 at an annual frequency. The detailed definitions of variables are given in Appendix A.

Table I. Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Tobin's q	43,674	1.989155	1.701282	0.441042	11.24912
Cash	43,674	0.206705	0.23349	0	0.953199
CAPX	43,674	0.058932	0.074367	0	0.417402
Size	43,674	5.670136	2.227964	0.981119	10.94527
AQC	42,412	41.45375	155.9092	-1.718	1158.129
Cash Flow	43,674	-0.07322	0.295628	-1.77437	0.250823
Leverage	43,674	0.443902	0.231227	0.020195	0.955983
NWC	43,674	0.260978	0.252946	-0.31581	0.902087
Intangible	43,674	0.143176	0.182063	0	0.743031
R&D	43,674	0.186143	0.894866	0	7.61485
Sigma	43,674	1.093445	3.406885	0.023611	103.9912
Age	10,712	61.56031	7.714535	46	82
Ownership	43,674	0.000375	0.000888	0	0.00606
Dividend	43,674	0.332486	0.47111	0	1
New	43,674	0.132001	0.338495	0	1
Gender	43,674	0.764253	0.424469	0	1

Table I presents the descriptive statistics of our sample. The average value of Tobin's q is 1.98. It means, on average, firms are overvalued. Tobin's q varies from 0.44 (min) to 11.24 (max). The average ratio of cash holding to total assets is 20.67 %. The standard deviation of cash holdings to total assets is 23.35 %. The minimum assets are 2.66 Million. On average, the total assets of a firm are 290 million us dollar. The dividend indicator shows that approximately 33.24 % of the

firms give a dividend. Among all firms, 13.20 % are new economy firms, and 23.57% of CEOs are female.

Table II. Correlation Matrix.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A	1.00															
B	0.36	1.00														
C	0.03	-0.21	1.00													
D	0.27	-0.15	0.05	1.00												
E	-0.04	-0.15	-0.10	0.36	1.00											
F	0.20	-0.10	0.03	0.31	0.04	1.00										
G	-0.22	-0.45	0.00	0.18	0.15	-0.12	1.00									
H	0.25	0.71	-0.27	-0.26	-0.18	0.01	-0.59	1.00								
I	-0.07	-0.25	-0.35	0.17	0.31	0.03	0.09	-0.29	1.00							
J	0.13	0.34	-0.08	-0.11	-0.02	-0.37	-0.09	0.20	-0.04	1.00						
K	0.01	0.15	0.01	-0.05	0.01	-0.07	-0.08	0.06	-0.04	0.05	1.00					
L	-0.04	0.00	-0.04	-0.17	-0.05	-0.02	-0.08	0.06	-0.04	0.04	-0.05	1.00				
M	0.03	0.00	-0.01	0.21	0.07	-0.02	0.10	-0.06	0.08	0.00	0.04	-0.09	1.00			
N	-0.04	-0.28	0.02	0.37	0.12	0.09	0.17	-0.21	0.00	-0.13	-0.11	-0.05	0.05	1.00		
O	0.16	0.37	-0.13	-0.06	-0.02	-0.09	-0.19	0.21	0.04	0.12	0.07	-0.03	0.00	-0.24	1.00	
P	0.00	-0.01	-0.02	0.00	0.01	0.00	0.01	0.02	-0.03	0.01	0.04	0.05	0.00	-0.04	0.01	1.00

Note: The meaning of A to P is given below.

Tobin's Q	A	Cash Flow	F	Sigma	K
Cash	B	Leverage	G	Age	L
CAPX	C	NWC	H	Ownership	M
Size	D	Intangible	I	Dividend	N
AQC	E	R&D	J	New	O
				Gender	P

Table II represents the correlation between the variables. The pairwise relationships between independent variables are quite small. So, we find no multicollinearity effect among any variables.

Table III. The difference in main variables in new and old economy firms.

Table III explains the main variables in new and old economy firms. Asterisks indicate significance at 0.01(***), 0.05(**), and 0.10(*) levels.					
Variables	Number of observations		Difference=mean(old)-mean(new)	t-statistics	p-values
	New Economy	Old Economy			
Cash	5,765	37,909	-0.1668***	-52.08	0.0000
R&D	5,765	37,909	-0.0512***	-4.05	0.0001
Age	1,441	9,271	0.820***	3.75	0.0002
Gender	1,441	9,271	-0.0079	-1.32	0.1837
Sigma	5,765	37,909	0.1173***	3.85	0.0001
Dividend	5,765	37,909	0.2599***	39.73	0.0000
Leverage	5,765	37,909	0.0557***	17.11	0.0000
Ownership	5,765	37,909	-0.00013***	-10.51	0.0000
NWC	5,765	37,909	-0.0944***	-26.61	0.0000
CAPX	5,765	37,909	0.0269***	25.81	0.0000

Table III reports the cash holdings by the new economy and old economy firms. Here, H0: diff=0, i.e., there is no significant difference in cash holdings to total assets between new and old economy firms. The alternate hypothesis is:

Ha: diff<0, diff>0, diff !=0

The table shows that the difference (mean (old)-mean (new)) is not equal to zero, and the p-value is 0.000. Thus, I reject the null hypothesis and accept the alternative explanation. It means new economy firms hold more cash compared to old economy firms. Institutional ownership ratio in the percentage of market capitalization is higher (0.0004895) in new economy firms as compared to old economy firms (0.0003577). The difference is statistically significant at 1%

significant level (p=0.000). I assume that as total institutional ownership increases, the monitoring of firms become more productive.

2.5.2 Multivariate Results

Table IV. Firm Performance and cash holdings.

The sample consists of an unbalanced panel data from 1,466 firms for the period 2000 to 2016. The dependent variable is Tobin's q. In column 2, we add CEO characteristics. In column 3, we add institutional ownership data. In column 4, we add year effect, and in Column 5, we add Industry effect. Tobin's q increases as cash holdings to total assets increase. But, it's (Tobin's q) decreases as cash holdings to overall assets increases. Column 1 and column 4 supports this idea. These columns do not include firms' fixed and random effects. t-statistics are in brackets. Asterisks indicate significance at 0.01(***), 0.05(**), and 0.10(*) levels.

VARIABLES	Tobin's q	Tobin's q	Tobin's q	Tobin's q	Tobin's q
Cash	3.068***	2.585***	2.597***	2.742***	1.656***
	(24.14)	(9.4)	(9.469)	(10.07)	(5.874)
Cash ^2	-0.990***	-0.645	-0.653	-0.851*	0.0356
	(-5.397)	(-1.287)	(-1.306)	(-1.721)	(0.0691)
Intangibles	-0.0961**	0.344***	0.355***	0.375***	-0.453***
	(-2.386)	(6.013)	(6.209)	(6.564)	(-6.111)
Size	0.263***	0.272***	0.276***	0.273***	0.288***
	(57.36)	(28.51)	(28.10)	(27.91)	(29.31)
Leverage	-1.035***	-2.654***	-2.658***	-2.617***	-2.629***
	(-6.680)	(-9.281)	(-9.305)	(-9.334)	(-9.594)
R&D	0.0428**	0.364***	0.362***	0.371***	0.313***
	(2.427)	(3.624)	(3.622)	(3.767)	(3.206)
NWC	-0.102*	0.348***	0.353***	0.365***	0.317***
	(-1.706)	(3.751)	(3.809)	(3.908)	-2.613
Dividend	-0.236***	-0.0892***	-0.0901***	-0.0808***	-0.0387
	(-14.39)	(-3.812)	(-3.849)	(-3.490)	(-1.632)
CAPX	1.398***	2.670***	2.683***	2.550***	3.626***
	(10.35)	(10.63)	(10.67)	(10.36)	(11.96)
AQC	0.000710***	0.000573***	0.000578***	0.000564***	0.000494***
	(-24.49)	(-14.78)	(-14.83)	(-14.66)	(-12.99)
Cash Flow	-1.448***	1.426***	1.406***	1.380***	1.203***
	(-23.43)	(8.094)	(7.967)	(7.913)	(7.311)
Sigma	0.0147***	-0.0246***	-0.0236***	-0.0263***	-0.0602**
	(3.047)	(-3.031)	(-2.921)	(-3.380)	(-2.151)
Age		0.000301	0.000124	-0.00439***	-0.00479***
		(0.191)	(0.0789)	(-2.606)	(-2.941)
Gender		0.0747	0.0746	0.0654	0.129**
		(1.349)	(1.345)	(1.186)	(2.401)
Constant	0.120***	-0.0787	-0.0868	0.760***	1.059***
	(2.654)	(-0.504)	(-0.555)	(4.278)	(4.408)
Industry Effect	NO	NO	NO	NO	Yes

Year Effect	NO	NO	NO	Yes	Yes
Observations	42,412	10,166	10,166	10,166	10,153
R-squared	0.26	0.292	0.292	0.315	0.387

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Here the dependent variable is Tobin's q, and independent variables are cash holding and cash holding square. In the first column, CEO characteristics like CEO age, and CEO gender, year, and industry effects are not included. In column 2, CEO characteristics (CEO age, and CEO gender) are included, but the year and industry effects are not included. In column 3, CEO characteristics, as well as total institutional ownership, is included. In column 4, we add year effects with CEO characteristics. In column 5, we include industry effects and year effects with CEO characteristics and total institutional ownership.

The coefficient on cash holdings to total assets is positive, while the factor on the square of cash holdings to total assets is negative. It indicates that a firm's value first increases with cash holdings, but it decreases after specific maximum cash holdings. Thus, I can claim that the excess cash holdings beyond the optimum level are a terrible indicator for any firm.

Table V. Firm Performance and Excess Cash Holdings

The sample consists of an unbalanced panel data for the period 2000 to 2016. The dependent variable is Tobin's q. t-statistics are in brackets. Asterisk indicates significance at 0.01 (***),0.05 (**), and 0.10 (*). Column 1 indicates that firm performance decreases when the excess cash increases at a 10 % significance level. We follow Winifred Huang and khalifa Mazouz's (2018) paper, "Excess cash, trading continuity, and liquidity risk," to calculate excess cash (Ecash).

VARIABLES	Tobin's q	Tobin's q	Tobin's q	Tobin's q	Tobin's q
Ecash	-2.794*	3.832***	1.459	0.741	0.833
	(-1.850)	(4.233)	(1.515)	(0.81)	(0.91)
Size	0.270***	0.409***	0.579***	0.685***	0.693***
	(17.09)	(31.93)	(38.7)	(42.23)	(42.56)
Leverage	-0.263***	0.387***	0.695***	0.925***	0.918***
	(-3.718)	(5.855)	(9.746)	(13.39)	(13.23)
R&D	3.951***	-1.874***	-2.719***	-1.959***	-1.938***
	(4.12)	(-3.406)	(-4.858)	(-3.677)	(-3.637)
NWC	2.269***	-1.033**	-0.432	0.0831	0.0619
	(2.992)	(-2.280)	(-0.911)	(0.184)	(0.138)
Dividend	-0.163***	-0.149***	-0.197***	-0.0992***	-0.0885**

	(-3.687)	(-4.315)	(-5.367)	(-2.832)	(-2.523)
CAPX	2.365***	3.188***	3.361***	2.511***	2.534***
	(10.1)	(14.2)	(14.12)	(10.81)	(10.87)
AQC	-0.00037***	-0.00018***	-0.00018***	-0.00018***	-0.00018***
	(-15.85)	(-8.166)	(-8.269)	(-8.652)	(-8.622)
Cash Flow	2.463***	1.000***	0.629***	0.388***	0.372***
	(14.15)	(11.42)	(6.992)	(4.485)	(4.3)
Sigma	0.0476	-0.0452	-0.0251	0.0555	0.103
	(1.525)	(-1.387)	(-0.428)	(0.996)	(0.578)
Age		0.00525*			
		(1.877)			
Gender		-0.044			
		(-0.383)			
Constant	-0.335***	-1.990***	-2.884***	-3.146***	-3.340***
	(-3.651)	(-8.730)	(-25.32)	(-25.23)	(-9.521)
Fixed Effect	No	No	Yes	Yes	Yes
Random Effect	No	Yes	No	No	No
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	No	Yes
Observations	10,167	10,167	10,167	10,167	10,154
R-squared	0.286	0.293	0.311	0.382	0.388

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

2.5.3 Cash holdings and firm performance

Table VI shows that as size (market value of equity) increases, firms tend to hold more cash, and the relationship is significant at a 1% significance level. There is a negative association between cash holdings to total asset ratio to CEO age. When the CEO becomes more experienced, they make the optimum use of cash. Furthermore, New economy firms hold more cash as compared to old economy firms by 10%. It supports my second hypothesis. With the increase of total institutional ownership, cash holdings decrease. I use institutional ownership as a proxy for corporate governance. Firms hold less cash when corporate governance is strong. It supports my third hypothesis.

Table VI. Cash Holdings in New and Old Economy Firms

The sample consists of an unbalanced panel data for the period 2000 to 2016. The dependent variable is Tobin's q. t-statistics are in brackets. Asterisk indicates significance at 0.01 (***),0.05 (**), and 0.10 (*). Cash is cash holdings to total assets. Column 1 indicates that firm performance decreases when the excess cash increases at a 10 % significance level.

VARIABLES	Cash	Cash	Cash	Cash	Cash
Size	0.0107***	0.0131***	0.0146***	0.0147***	0.0148***
	(26.54)	(14.59)	(16.66)	(16.46)	(17.06)
Leverage	-0.0291***	-0.0273***	-0.0274***	-0.0260***	0.00632
	(-7.563)	(-3.520)	(-3.531)	(-3.348)	-0.86
R&D	0.0359***	0.0875***	0.0860***	0.0859***	0.0727***
	(36.84)	(12.06)	(11.84)	(11.78)	(11.37)
NWC	0.600***	0.534***	0.536***	0.537***	0.637***
	(138.6)	(56.82)	(56.74)	(56.71)	(61.93)
Dividend	-0.0461***	-0.0353***	-0.0371***	-0.0368***	-0.0274***
	(-28.19)	(-14.59)	(-15.06)	(-14.89)	(-11.97)
CAPX	0.0563***	-0.0594***	-0.0565***	-0.0457***	-0.0838***
	(6.959)	(-3.395)	(-3.230)	(-2.585)	(-3.953)
AQC	-2.91e-05***	-4.36e-05***	-4.36e-05***	-4.25e-05***	-2.70e-05***
	(-10.23)	(-11.12)	(-11.18)	(-10.79)	(-7.385)
Cash Flow	-0.162***	-0.0592***	-0.0553***	-0.0560***	-0.0671***
	(-45.06)	(-3.998)	(-3.766)	(-3.754)	(-4.895)
Sigma	0.00612***	0.0120***	0.0116***	0.0116***	0.0164***
	(19.2)	(9.973)	(9.721)	(9.74)	(3.494)
Age		-0.000458***	-0.000528***	-0.000533***	-0.000679***
		(-3.179)	(-3.626)	(-3.507)	(-4.680)
Gender		-0.0277***	-0.0266***	-0.0264***	-0.0110**
		(-4.521)	(-4.326)	(-4.308)	(-2.024)
New	0.0865***	0.100***	0.100***	0.100***	0.0961***
	(37.55)	(24.45)	(24.5)	(24.58)	(20.28)
Ownership			-0.0341***	-0.0358***	-0.0243***
			(-5.078)	(-5.165)	(-3.592)
Constant	-0.0206***	0.0107	0.0305**	0.0151	-0.017
	(-6.826)	(0.742)	(1.975)	(0.915)	(-0.551)
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	No	Yes
Observations	42,412	10,166	10,166	10,166	10,153
R-squared	0.642	0.619	0.62	0.621	0.706

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In table VI, the result shows that new economy firms hold 10.0 percent more cash as compared to old economy firms. If the firms spend more on research and development activities,

they hold more money for a precautionary motive. The data analysis indicates that firms' cash holdings to total assets increase by 0.875 % if their expenditures on R & D to sale increase by ten percent. The success of new economy firms depends on their innovative idea. Thus, for precautionary motives, these firms hold more cash as compared to old economy firms.

Institutional ownership structure impacts to firm's performance and cash holdings. We use total institutional ownership in the percentage of market capitalization as a proxy for corporate governance. As the institutional ownership increases, we can imagine the better and effective monitoring mechanism within the firm. As a result, there is a better governance mechanism. When total institutional ownership increases by 1%, the cash holdings to total assets decreased by 3.58%, which is significant at a 1% significance level (Table VI). It supports that firms hold less cash if they have a better governance mechanism.

Table VII. Cash Holdings by Total Assets

Table VII. The dependent variable is Cash. Cash is cash holdings to total assets (at). Column 1 to 6 divides the firms in terms of total assets. The first column presents the regression output for firms whose total assets are below $1 Billion. Similarly, the second column is for firms whose total assets lie between 1 to 50 Billion US dollars. Column 5 presents regression output for firms whose assets are higher than $150 Billion. z-statistics are in brackets. Asterisk indicates at 0.01(***), 0.05(**), and 0.10(*) significance levels.

VARIABLES	Cash at<1 billion	Cash 1<at<50	Cash 50<at<100	Cash 100<at<150	Cash at>150	Cash Full Sample
Size	0.0110***	0.00940***	0.0337**	-0.0834*	0.00675	0.00823***
	(3.82)	(4.283)	(2.274)	(-1.779)	(0.19)	(4.917)
Leverage	0.0660***	0.0378***	0.127***	-0.245	0.085	0.0445***
	(3.952)	(2.822)	(3.181)	(-0.614)	(0.939)	(3.983)
R&D	0.0157**	0.0930**	0.396**	-0.606	-0.0222	0.0198***
	(2.535)	(2.216)	(2.193)	(-1.228)	(-0.0955)	(3.015)
NWC	0.733***	0.538***	0.816***	1.153***	0.903***	0.669***
	(38.46)	(21.38)	(5.808)	(6.633)	(5.132)	(41.02)
dividend	-0.0125**	-0.00428	-0.162***	0.0542		-0.00745**
	(-2.136)	(-1.171)	(-5.397)	(0.304)		(-2.183)
CAPX	-0.191***	-0.136***	0.164	1.667	-0.0894	-0.157***
	(-4.663)	(-4.828)	(0.626)	(0.846)	(-0.398)	(-6.311)
AQC	-0.00012***	-1.6e-05***	-8.39E-06	-2.57E-05	1.28e-05**	-1.1e-05***
	(-3.773)	(-6.250)	(-0.708)	(-1.078)	(2.014)	(-3.853)
CF	-0.0400***	0.0183*	0.0433	0.49	0.341**	-0.0198**
	(-3.048)	(1.885)	(0.679)	(1.438)	(2.299)	(-1.993)

Sigma	0.0143***	-0.00169	0.0258***	7.16E-05	0.0143	0.00346
	(8.027)	(-1.164)	(5.287)	(0.00164)	(0.253)	(0.456)
New	0.0880***	0.0808***	0.288***			0.0887***
	(4.817)	(5.473)	(5.797)			(6.912)
Age	-0.00140***	-0.000657*	0.00317	0.0182***	0.000287	-0.00073**
	(-2.628)	(-1.821)	(1.488)	(19.3)	(0.0267)	(-2.151)
Gender	-0.0156	0.00228	-0.330***	-0.0953		-0.0106
	(-0.677)	(0.17)	(-4.856)	(-1.487)		(-0.745)
Ownership	-0.0169	-0.00377	0.117	-0.0152	-0.237	-0.0147
	(-1.030)	(-0.278)	(1.536)	(-0.0257)	(-0.610)	(-1.339)
Constant	0.0588	-0.112***	-0.301			-0.0513
	(1.167)	(-2.910)	(-1.093)			(-0.891)
Year effect	yes	yes	yes	yes	yes	Yes
Industry effect	yes	yes	yes	yes	yes	Yes
Observations	4,439	5,565	96	29	24	10,153
Number of gvkey	767	880	26	9	4	1,434

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Cash holdings rise from the early to the late subperiods. Non-financial U.S. firms held approximately $1.9 trillion cash and short-term liquid investments in 2016 (Chang et al. (2017)). This value is more than 10% greater than the cash holdings in 2015. The trend of holding cash is increasing. However, U.S. corporate cash holdings decrease to $1.685 trillion in 2018 (three years low), according to Maria Armental in *The Wall Street Journal*, June 10, 2019 (https://www.wsj.com/articles/u-s-corporate-cash-piles-drop-to-three-year-low-11560164400).

There exists a significant gap in cash holdings between large and small firms. To examine this gap, we estimate our model separately on subsamples of large and small firms in total assets. I divide the firms into different subgroups based on total assets.

Table VII that cash holdings to total assets increase by 1.57% in small firms (total assets<1 Billion). The results are significant at a 1% significance level if those firms increase their research and development expenditures by $100 million. Among those firms, new economy firms hold 8.8 percent more cash as compared to old economy firms. We find similar results when we consider

the full sample. However, there is a negative relationship between cash holdings and research and development expenditures for more prominent firms (total assets>$100 Billion). The main reason is that more significant firms have less cash flow volatility than small firms' cash volatility.

Table VIII shows that the firm's performance (Tobin's Q) and cash holdings have a positive and significant (1% significance level) relationship for the firms whose total assets are less than $1 billion. When these firms hold more cash, the relationship reverses, i.e., firm performance reduces. However, the reduction in firm performance with more considerable money is statistically insignificant. Furthermore, investment in research and development activities are correlated with reduced firm performance. There exists a negative relationship between CEO age and firm performance.

Table VIII. Firm Performance and Cash Holdings by Total Assets

Table VIII. The dependent variable is Tobin's Q. Column 1 to 6 divides the firms in terms of total assets. The first column presents the regression output for firms whose total assets are below $1 Billion. Similarly, the second column is for firms whose total assets lie between 1 to 50 Billion US dollars. Column 4 presents regression output for firms whose assets are higher than $100 Billion. z-statistics are in brackets. Asterisk indicates at 0.01(***), 0.05(**), and 0.10(*) significance levels.

VARIABLES	Tobin's Q at <1	Tobin's Q 1<at<50	Tobin's Q 50<at<100	Tobin's Q at>100	Tobin's Q Full sample
Cash	1.502***	1.336***	0.71	0.217	1.845***
	(3.21)	(3.655)	(0.484)	(0.0327)	(5.305)
Cash^2	-0.518	-1.14	-2.843	9.907	-0.952*
	(-0.754)	(-1.536)	(-1.550)	(0.812)	(-1.805)
Size	0.820***	0.539***	0.391**	0.696***	0.469***
	(17.69)	(15.85)	(2.199)	(7.155)	(21.34)
Leverage	1.009***	0.534***	-0.188	-2.369**	0.387***
	(5.644)	(3.437)	(-0.509)	(-2.515)	(3.315)
R&D	-0.0641	0.106	-2.529	1.127	-0.0548
	(-0.575)	(0.13)	(-0.824)	(0.615)	(-0.424)
NWC	0.472	0.897***	-0.241	-4.551*	0.828***
	(1.589)	(3.267)	(-0.208)	(-1.794)	(3.807)
Dividend	-0.225***	-0.113***	-1.748***	0.611	-0.198***
	(-3.674)	(-2.647)	(-8.852)	(0.887)	(-5.125)
CAPX	1.947***	2.934***	-5.549***	-6.34***	3.319***
	(3.775)	(6.849)	(-3.100)	(-3.177)	(8.386)
Acquisitions	-0.0023***	-0.0002***	-7E-05	-3.8E-06	-0.0003***

	(-7.406)	(-6.934)	(-1.054)	(-0.0677)	(-9.654)
Cash Flow	-0.188	0.637***	1.903***	8.505***	0.339*
	(-0.825)	(4.592)	(2.964)	(3.971)	(1.92)
Sigma	0.152***	-0.0667***	0.00453	-0.394	-0.0219
	(6.654)	(-4.348)	(0.11)	(-0.558)	(-0.573)
CEO age	-0.00681	-0.0127***	-0.042***	-0.07***	-0.00481
	(-1.270)	(-3.537)	(-2.686)	(-4.272)	(-1.332)
CEO Gender	-0.0287	0.211*	2.796	-0.983**	0.0249
	(-0.131)	(1.79)	(1.157)	(-2.092)	(0.175)
Constant	-2.852***	-1.540***			-1.062**
	(-5.018)	(-3.897)			(-2.431)
Year effect	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes
Observations	4,439	5,565	96	53	10,153
Number of gvkey	767	880	26	10	1,434

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The effect is insignificant for smaller firms (total assets less than $1 billion) but is significant at the 1% level when total assets are more than $1 Billion.

Firm performance is significantly lower with male CEOs compared to female CEOs in firms whose total assets exceed $100 Billion, at the 5% level. Thus, for more prominent firms, Female CEOs appear to perform better than Male CEOs. A possible explanation may lie in gender differences concerning risk analysis and management (Blumberg (2018) and Yoni (2018)).

2.5.4 Lagrange Multiplier (LM) Breusch- Pagan Test

H0: Pooled regression model is appropriate

Ha: Random effect model is suitable.

Here p=0.000 (with LR = 11410.20) which is significant at 1% significance level. I reject the null hypothesis. The random effect model is more appropriate as compared to the pooled regression model. Then, I test whether the fixed effect model or random effect model is appropriate. I do the Hausman Test to check whether the fixed effect model is appropriate or not.

2.5.5 Hausman Test

H0: Random effect model appropriate

Ha: Fixed effect model suitable

Here P= 0.000 with (LR = 1362.47), which is significant at a 1% significance level, I reject the null hypothesis and accept the fixed effect model. For all models, Tobin's q first increases with cash holdings, with results significant at the 1% level. Firm value decreases as cash holdings increase after a maximum cash holding value, which is deemed optimal. These findings support first hypothesis.

Table IX. Fixed Effect, Random Effect and LM Test

Table IX. The dependent variable is Tobin's Q. z-statistics are in brackets. Asterisk indicates at 0.01(***), 0.05(**), and 0.10(*) significance levels. I use year effects, fixed effects, and industry effects.

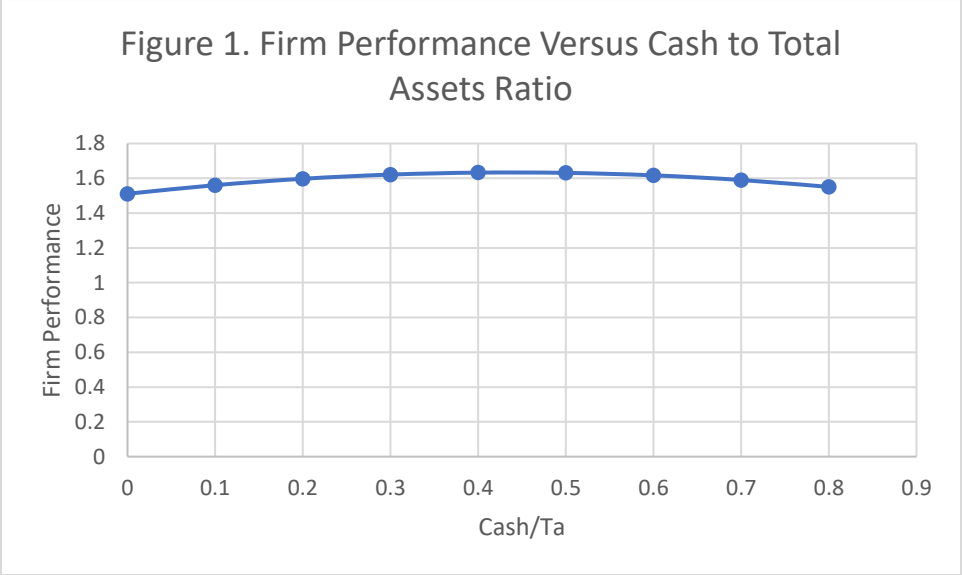
VARIABLES	Tobin's q	Tobin's q	Tobin's q	Tobin's q	Tobin's q
Cash	2.597***	1.482***	0.177	0.559***	0.504**
	(9.469)	(7.4)	(0.827)	(2.691)	(2.409)
Cash^2	-0.653	-0.645**	-0.163	-0.637**	-0.595**
	(-1.306)	(-2.495)	(-0.615)	(-2.498)	(-2.326)
Size	0.276***	0.494***	0.728***	0.799***	0.806***
	(28.1)	(44.56)	(53.69)	(52.98)	(53.0)
Leverage	-2.658***	-1.894***	-1.442***	-1.166***	-1.144***
	(-9.305)	(-7.908)	(-5.926)	(-4.982)	(-4.855)
R&D	0.362***	-0.0334	-0.184***	-0.174***	-0.174***
	(3.622)	(-0.963)	(-5.193)	(-5.116)	(-5.112)
NWC	0.353***	0.277**	-0.173	-0.0685	-0.0431
	-3.809	-2.473	(-1.358)	(-0.558)	(-0.346)
Dividend	-0.0901***	-0.318***	-0.292***	-0.172***	-0.162***
	(-3.849)	(-11.30)	(-9.580)	(-5.759)	(-5.416)
CAPX	2.683***	2.384***	2.111***	1.441***	1.433***
	-10.67	-9.558	-8.214	-5.717	-5.656
AQC	0.000578***	0.000193***	0.000131***	0.000143***	0.000142***
	(-14.83)	(-4.787)	(-3.356)	(-3.823)	(-3.788)
Cash Flow	1.406***	0.397***	0.263***	0.146**	0.135**
	(7.967)	(5.498)	(3.683)	(2.123)	(1.961)
Sigma	-0.0236***	0.00291	0.00815	0.0393	0.0207
	(-2.921)	(0.157)	(0.192)	(0.963)	(0.296)
Age	0.000124	0.00479			
	(0.0789)	(1.625)			
Gender	0.0746	0.0111			

	(1.345)	(0.0922)			
Constant	-0.0868	-1.511***	-2.566***	-2.633***	-2.799***
	(-0.555)	(-6.181)	(-20.60)	(-19.30)	(-7.686)
Fixed Effect	NO	No	No	Yes	No
Random Effect	No	Yes	No	No	No
LM Test	No	Yes	No	No	No
Year effect	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes
Hausman Test	NO	No	No	Yes	No
Observations	10,166	10,166	10,166	10,166	10,153
R-squared	0.292	0.296	0.33	0.386	0.391
Number of gvkey		1,436	1,436	1,436	1,434

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table IX reports pooled regression, fixed effect, and random effect models. I use the LM test and Hausman test to determine whether a fixed or random model is better. The LM test shows that random effect is better than pooled regression. Furthermore, the Hausman Test shows that the random result is better than the fixed effect model.



I use the fixed and year effect model in column 4 of Table IX. Figure 1 shows that firm performance initially increases with cash holdings to total assets ratio (Table IX, Column 4). However, it starts to decrease when cash holdings to total assets increase beyond 0.45. Column 1, 2, 4, and column 5 supports this idea. Firms fixed the effect, and random effects are included.

T-statistics are in brackets. Asterisks indicate significance at 0.01(***), 0.05(**), and 0.10(*) levels.

Table X. Cash Holdings and Research and Development Expenditures

Table X. Here the dependent variable is a log of one plus cash holding to total assets.

VARIABLES	L(Cash)	L(Cash)	L (Cash	L (Cash)	L (Cash)
Size	0.00888***	0.0113***	0.0123***	0.0123***	0.0124***
	(29.46)	(16.23)	(17.94)	(17.71)	(18.57)
Leverage	-0.0338***	-0.0329***	-0.0330***	-0.0318***	-0.00605
	(-11.66)	(-5.495)	(-5.499)	(-5.304)	(-1.074)
R&D	0.0235***	0.0580***	0.0571***	0.0570***	0.0467***
	(36.66)	(10.91)	(10.71)	(10.64)	(10.06)
NWC	0.445***	0.417***	0.418***	0.419***	0.489***
	(145.4)	(60.13)	(60.03)	(59.96)	(65.16)
Dividend	-0.0366***	-0.0293***	-0.0304***	-0.0302***	-0.0224***
	(-29.35)	(-15.27)	(-15.60)	(-15.46)	(-12.34)
CAPX	0.0394***	-0.0645***	-0.0627***	-0.0534***	-0.0642***
	(6.285)	(-4.509)	(-4.384)	(-3.692)	(-3.762)
AQC	-2.73e-05***	-3.68e-05***	-3.68e-05***	-3.59e-05***	-2.43e-05***
	(-12.11)	(-11.56)	(-11.61)	(-11.22)	(-8.260)
Cash Flow	-0.119***	-0.0462***	-0.0437***	-0.0442***	-0.0541***
	(-46.90)	(-4.349)	(-4.138)	(-4.120)	(-5.508)
Sigma	0.00445***	0.00976***	0.00953***	0.00953***	0.0102***
	(20.01)	(10.6)	(10.34)	(10.35)	(3.118)
Age		-0.000445***	-0.000489***	-0.000478***	-0.000583***
		(-3.932)	(-4.282)	(-4.012)	(-5.132)
Gender		-0.0232***	-0.0225***	-0.0223***	-0.00935**
		(-4.864)	(-4.702)	(-4.669)	(-2.236)
New	0.0726***	0.0796***	0.0795***	0.0797***	0.0755***
	(42.84)	(25.94)	(25.98)	(26.07)	(20.94)
Ownership			-0.0215***	-0.0233***	-0.0168***
			(-4.175)	(-4.395)	(-3.244)
Constant	0.00380*	0.0289**	0.0414***	0.0266**	0.00866
	(1.672)	(2.557)	(3.445)	(2.063)	(0.327)
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	No	Yes
Observations	42,412	10,166	10,166	10,166	10,153
R-squared	0.642	0.62	0.621	0.622	0.707

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In Table X, we use the log of cash holding as the dependent variable. If there is an increase in research and development expenditures to sale by one unit, cash holdings to total assets increase by 2.35 %, and it is significant at a 1% significance level. Similarly, when cash flow volatility increases by 1 unit, cash holdings to total assets increase by 0.04%. When we control year and industry effects, growth on cash holdings to total assets becomes more prominent, and it increases by 1.02%, which is again significant at a 1% significance level. Women CEO holds less cash as compared to Male CEO, and the result is also vital. Likewise, younger CEOs like to keep more capital as compared to older CEOs.

Table XI. Cash Holdings and R&D Expenditures by Cash

Table XI describes the sub-sample analysis of cash holdings to total assets ratio. NEW*RD is an interaction term. Column 1 represents the firms whose cash holdings to total assets ratio lie below 0.20 or 20%. Similarly, column 2 represents all firms whose cash to total assets ratio is equal to 20 percent and less than 40%.

VARIABLES	Cash cash<0.20	Cash 0.20<cash>0.40	Cash 0.40<cash>0.60	Cash cash>0.60	Cash Full Sample
Size	0.00731***	0.00418**	-6.32e-05	0.000777	0.0101***
	(6.492)	(2.378)	(-0.0237)	(0.173)	(5.796)
Leverage	-0.00695	0.0563***	0.0932***	0.0147	0.0694***
	(-0.834)	(4.803)	(4.608)	(0.757)	(5.569)
R&D	0.235***	0.110***	0.0828**	0.0142	0.209***
	(4.826)	(2.729)	(2.039)	(0.469)	(3.862)
NEW	0.0266***	0.0333***	0.0170	-0.0145	0.0648***
	(2.988)	(2.700)	(0.904)	(-0.709)	(4.687)
NEW*RD	-0.0274	-0.0128	-0.0503	0.0860	0.0509
	(-0.416)	(-0.215)	(-0.721)	(1.039)	(0.508)
NWC	0.272***	0.314***	0.295***	0.147***	0.695***
	(17.23)	(14.48)	(9.255)	(3.442)	(37.71)
Dividend	-0.00311	-0.00542	-0.0111	0.00894	-0.00807**
	(-1.256)	(-1.153)	(-1.569)	(0.750)	(-2.149)
CAPX	-0.0745***	-0.120***	-0.154**	-0.284	-0.175***
	(-3.534)	(-2.855)	(-2.199)	(-1.302)	(-6.445)
AQC	-5.47e-06***	-1.59e-05***	-1.93e-05*	-0.000265	-6.01e-06***
	(-5.376)	(-5.156)	(-1.918)	(-1.354)	(-4.118)
Cash Flow	-0.00482	0.00432	0.0235	-0.0217	0.0210
	(-0.518)	(0.243)	(1.084)	(-1.373)	(1.554)
Sigma	0.00239	0.00974***	0.00349	0.147***	0.0190
	(0.293)	(3.335)	(0.488)	(12.42)	(0.991)
Age		-0.000819***	-0.000533	-0.000867*	-0.000650*
		(-2.758)	(-1.165)	(-1.659)	(-1.737)
Gender		-0.00174	0.0221	-0.0215	-0.00480

		(-0.170)	(0.756)	(-0.656)	(-0.341)
Ownership			-0.0155	-0.0386**	-0.00291
			(-1.002)	(-2.022)	(-0.248)
Constant	-0.0624***	0.153***	0.348***		-0.141***
	(-3.982)	(5.158)	(8.962)		(-3.261)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
R-Square	0.68	0.34	0.25	0.28	0.68
Observations	5,028	1,417	552	246	7,243
Number of gvkey	962	458	210	83	1,187

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In Table XI, I create an interaction term NEW*RD and make subsample analysis. The first column represents the firms whose cash holdings to total asset ratio is less than 0.20 or 20%. Similarly, the second column represents firms whose cash holdings to the entire asset ratio are equal to 20 % and less than 40%. The fifth column is for the full sample. Column IV and V (cash to total assets ratio>0.60 and full - sample) show that new economy firms hold more money by 0.86% and 0.51%, respectively, if they spend 10% more on research and development activities. This increment is positive but not significant.

I use an interaction term NEW*BBP in Table XII to test whether the board diversity policy affects cash holdings in new economy firms. The table shows a positive but insignificant relationship between board diversity policy and cash holdings in new economy firms in all sub-samples except for the group with employees more than 65 and less than 100.

Table XII. Cash Holdings and Balanced Board Structure Policy (BBP)

Table XII. The dependent variable is cash holding to the total asset. This table shows how balanced board diversity policy impacts to cash holdings in new economy firms. I use an interaction term of NEW*BBP to test whether the board diversity policy affects cash holdings in new economy firms or not. Here emp is the number of employees in the company. The average number of employees is 65, and the minimum and the maximum number of employees are 0 and 2300, respectively.

VARIABLES	Cash emp<65	Cash 65<emp<100	Cash 100<emp<200	Cash emp>300
Size	-0.000733	0.00950	0.0393	0.0372
	(-0.119)	(0.671)	(1.282)	(1.369)
Leverage	-0.133***	-0.139*	0.0706	0.150**
	(-3.587)	(-1.691)	(0.359)	(2.055)
R&D	0.102	0.895*	0.349	-4.375*
	(0.768)	(1.959)	(0.397)	(-1.737)
CAPX	-0.630***	-0.316	-0.587	-1.155***
	(-3.778)	(-1.186)	(-0.779)	(-5.015)
New	0.144***	0.165**	0.0586	0.824**
	(3.466)	(1.963)	(0.426)	(2.497)
BBP	0.00941	0.0371*	-0.0428	-0.00211
	(1.045)	(1.936)	(-0.992)	(-0.162)
NEW*BBP	0.0151	-0.0749**	0.116	0.0375
	(0.596)	(-2.273)	(0.716)	(1.102)
Sigma	0.0459	-0.0406	-0.172	0.0214
	(0.261)	(-1.303)	(-0.459)	-0.13
Age	0.000936	0.00457***	-0.00173	0.00214
	(0.872)	(4.150)	(-0.568)	(1.274)
Gender	-0.00399	-0.000340	-0.0207	0.668***
	(-0.178)	(-0.00775)	(-0.376)	(3.888)
Constant	0.154*	0	0	-1.195**
	(1.783)			(-2.402)
Year Effect	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes
R-squared	0.432	0.91	0.8	0.9
Observations	1,003	105	99	54
Number of gvkey	264	26	25	10

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In this group, the board diversity policy impacts negatively on cash holdings. Cash holdings decrease by 7.5% in new economy firms with balanced board structure policy. It supports my hypothesis 4.

Table XIII. Firm Performance and CEO Age

Table XIII. Here Tobin's q is the dependent variable. This table shows the impact of CEO age square on firm performance. Firm performance improves after a certain CEO age.

VARIABLES	Tobin's q	Tobin's q	Tobin's q	Tobin's q	Tobin's q
Cash	2.108***	2.084***	2.231***	2.329***	1.220***
	(9.793)	(9.630)	(10.44)	(10.97)	(5.713)
Cash^2	-0.110	-0.116	-0.454	-0.578	0.428
	(-0.296)	(-0.311)	(-1.237)	(-1.593)	(1.165)
Intangible	0.275***	0.280***	0.428***	0.404***	-0.350***
	(4.922)	(5.002)	(7.394)	(7.027)	(-4.980)
Size	0.227***	0.230***	0.261***	0.250***	0.270***
	(27.14)	(27.37)	(28.93)	(27.65)	(29.75)
Leverage	-0.109*	-0.0817	-0.0375	-0.0556	-0.0394
	(-1.652)	(-1.230)	(-0.567)	(-0.850)	(-0.589)
R&D	1.737***	1.764***	1.763***	1.750***	1.682***
	(8.164)	(8.302)	(8.431)	(8.464)	(7.742)
NWC	0.396***	0.419***	0.568***	0.536***	0.505***
	(4.533)	(4.794)	(6.437)	(6.050)	(4.499)
Dividend	-0.0406*	-0.0357*	-0.0682***	-0.0614***	-0.0172
	(-1.928)	(-1.688)	(-3.217)	(-2.918)	(-0.792)
CAPX	2.989***	3.036***	3.403***	3.206***	4.059***
	(11.47)	(11.66)	(13.02)	(12.37)	(13.05)
AQC	-0.0003***	-0.0003***	-0.0003***	-0.00035***	-0.00032***
	(-14.14)	(-14.15)	(-14.84)	(-14.82)	(-13.64)
Cash Flow	2.442***	2.437***	2.587***	2.543***	2.218***
	(14.87)	(14.84)	(16.17)	(15.70)	(14.29)
Sigma	-0.0399***	-0.0389***	-0.0399***	-0.0432***	-0.164***
	(-3.523)	(-3.415)	(-3.596)	(-3.926)	(-2.598)
Age		-0.0973***	-0.0863***	-0.0814***	-0.0798***
		(-5.460)	(-4.975)	(-4.739)	(-4.775)
Age^2		0.000777***	0.000678***	0.000620***	0.000601***
		(5.541)	(4.979)	(4.605)	(4.582)
Gender		0.0165	0.0472	0.0373	0.0856*
		(0.313)	(0.885)	(0.705)	(1.674)
Constant	-0.353***	2.586***	2.585***	2.854***	2.993***
	(-4.769)	(4.669)	(4.776)	(5.305)	(5.438)
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	No	Yes
Observations	10,166	10,166	10,166	10,166	10,153
R-squared	0.318	0.321	0.338	0.353	0.425

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table XIII shows that there is a negative and statistically significant association between CEO age and firm performance. Furthermore, we find that firm performance improves as the CEO age further increases. More experienced CEO do better, and firm performance improves.

Table XIV. Firm Performance by Time Periods

Table XIV. Here Tobin's q is the dependent variable. The table represents the sub-period regression analysis. Excess cash holdings have a positive and significant association with the firm performance from 2007 to 2009 (financial crisis).

VARIABLES	Tobin's q 2000-2006	Tobin's q 2007-2009	Tobin's q 2010-2012	Tobin's q 2012-2016	Tobin's q 2000-2016
Cash	1.142***	0.0205	1.441***	1.662***	1.164***
	(3.095)	(0.0465)	(2.908)	(3.666)	(5.412)
Cash^2	0.290	1.205*	0.646	0.344	0.469
	(0.476)	(1.681)	(0.715)	(0.461)	(1.276)
Intangible	-0.464***	-0.580***	-0.298*	-0.0542	-0.354***
	(-3.643)	(-4.173)	(-1.723)	(-0.379)	(-4.987)
Size	0.298***	0.214***	0.240***	0.239***	0.255***
	(17.57)	(11.87)	(11.32)	(14.02)	(28.29)
Leverage	-0.233*	-0.161	-0.118	0.171	-0.0337
	(-1.857)	(-1.343)	(-0.774)	(1.267)	(-0.501)
R&D	2.427***	1.183***	0.676	1.978***	1.674***
	(6.166)	(3.485)	(1.217)	(4.925)	(7.801)
NWC	0.760***	0.441**	-0.0355	0.439*	0.432***
	(3.607)	(2.090)	(-0.143)	(1.861)	(3.806)
Dividend	-0.0413	0.0712	0.0758	-0.0272	0.000363
	(-1.129)	(1.593)	(1.454)	(-0.599)	(0.0166)
CAPX	3.812***	1.300**	4.154***	5.130***	3.903***
	(6.862)	(2.452)	(5.683)	(7.592)	(12.44)
AQC	-0.00026***	-0.00029***	-0.00034***	-0.00034***	-0.00032***
	(-3.289)	(-5.797)	(-7.282)	(-10.07)	(-13.22)
Cash Flow	2.852***	1.435***	1.379***	3.058***	2.266***
	(9.115)	(6.381)	(3.027)	(9.636)	(14.44)
Sigma	-0.210*	-0.0818	-0.146*	0.0336	-0.161**
	(-1.813)	(-1.271)	(-1.807)	(1.438)	(-2.479)
Age	-0.109***	-0.0616*	-0.0640*	-0.127***	-0.0853***
	(-2.979)	(-1.940)	(-1.726)	(-3.075)	(-5.030)
Age^2	0.000819***	0.000426*	0.000495*	0.00103***	0.000651***
	(3.000)	(1.739)	(1.653)	(3.005)	(4.879)
Gender	0.349***	0.122	0.117	-0.103	0.0876*
	(3.677)	(1.495)	(1.372)	(-0.982)	(1.734)
Constant	3.930***	2.274**	1.856*	3.867***	3.114***
	(3.171)	(2.359)	(1.753)	(3.109)	(5.539)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
Observations	2,901	1,900	2,032	2,958	9,791
R-squared	0.512	0.424	0.372	0.422	0.418

Robust t-statistics in
parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 2 shows the graphs between firm performance (Tobin's Q) and CEO age. It depicts that as CEO becomes older, firm performance decreases. However, after a certain age, (Here approximately 65), firm performance improves with more past CEOs. However, during the financial crisis period, firm performance decreases as CEO age increases. Substantial performance increases after the CEO reaches 75. The minimum CEO age for the Financial Crisis period is around 75. Probably, more experienced CEOs do better.

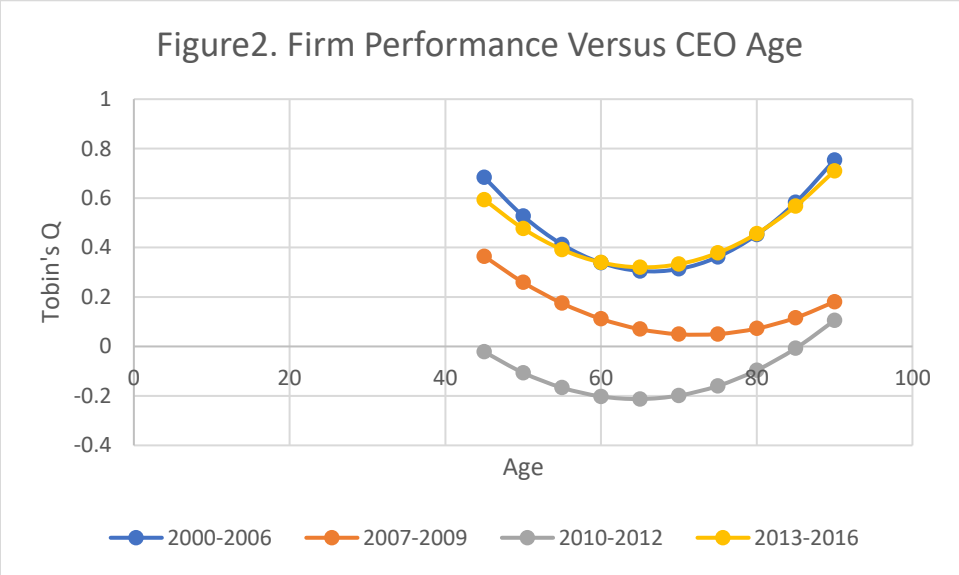


Table XIV describes the sub-period regression analysis. From 2007 to 2009 (Financial Crisis) period, we see no significant relationship between cash holdings and firm performance. However, firm performance improves with excess cash holdings. If cash holdings to total assets ratio increase by 10%, the firm performance increases by 1.2%, which is statistically significant at a 10% significant level. Keeping excess cash idle is expensive for firms during regular business periods. But, excess cash in hand can be highly beneficial when a financial crisis hit.

Excess liquid cash provides an internal fund source when cash flows decline or credit conditions tighten, and it becomes more expensive to borrow.

Table XV. Cash Holdings by Time Periods

Table XV. Here cash holdings to total assets ratio is the dependent variable. This table represents sub-period analyses of cash holdings.

VARIABLES	Cash 2000-2006	Cash 2007-2009	Cash 2010-2012	Cash 2012-2016	Cash 2000-2016
Intangible	-0.118***	-0.108***	-0.135***	-0.183***	-0.133***
	(-8.280)	(-6.937)	(-8.899)	(-15.00)	(-19.06)
Size	0.0122***	0.0113***	0.0116***	0.0140***	0.0126***
	(7.696)	(6.025)	(6.260)	(9.996)	(15.55)
Leverage	-0.0198	0.0338**	-0.00502	-0.0187	-0.00449
	(-1.421)	(2.130)	(-0.328)	(-1.606)	(-0.665)
R&D	0.528***	0.518***	0.581***	0.622***	0.556***
	(13.61)	(11.30)	(12.89)	(18.09)	(27.51)
NWC	0.556***	0.569***	0.511***	0.437***	0.524***
	(27.33)	(23.73)	(21.67)	(20.86)	(48.39)
Dividend	-0.0146***	-0.0273***	-0.0112**	-0.0137***	-0.0162***
	(-3.604)	(-4.954)	(-2.239)	(-3.308)	(-7.196)
CAPX	-0.267***	-0.159**	-0.252***	-0.304***	-0.240***
	(-5.330)	(-2.490)	(-4.421)	(-6.650)	(-9.367)
AQC	-1.05e-05	-1.45e-05*	-9.37e-06**	-2.98e-06	-7.63e-06***
	(-1.539)	(-1.900)	(-2.246)	(-0.904)	(-3.145)
Cash Flow	0.0280	-0.0223	-0.0135	-0.0419*	-0.0147
	(0.925)	(-0.720)	(-0.354)	(-1.722)	(-0.993)
Sigma	0.0354***	0.0626**	0.0880***	0.00751***	0.0453***
	(3.421)	(2.402)	(12.89)	(3.382)	(3.920)
New	0.0572***	0.0640***	0.0389***	0.0356***	0.0484***
	(6.255)	(5.944)	(3.717)	(4.490)	(10.32)
Age	-0.00317	-0.00835**	-0.00719*	-0.00875***	-0.00573***
	(-0.918)	(-2.100)	(-1.872)	(-2.925)	(-3.497)
Age^2	2.05e-05	6.14e-05*	5.26e-05*	6.78e-05***	4.14e-05***
	(0.775)	(1.958)	(1.697)	(2.757)	(3.182)
Gender	-0.0342***	-0.0156	-0.00707	0.00154	-0.0132***
	(-2.989)	(-1.163)	(-0.717)	(0.209)	(-2.601)
Ownership	-0.0181	0.00112	0.0122	-0.00692	-0.00759
	(-1.541)	(0.0803)	(0.810)	(-0.563)	(-1.187)
Constant	0.167	0.125	0.139	0.251***	0.156***
	(1.478)	(1.057)	(1.221)	(2.784)	(2.846)
Year effect	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes
Observations	2,901	1,900	2,032	2,958	9,791
R-squared	0.752	0.752	0.749	0.739	0.737

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Firms spend slightly less on research and development activities from 2007 through 2009 (i.e., The Financial Crisis) compared to other periods. Total institutional ownership has no significant relationship with cash holdings. New economy firms held approximately 6.4% more cash than old economy firms during the financial crisis period.

2.6 Conclusion

This essay adds to the literature on the association between corporate cash holdings and firm value. I find that corporate cash holdings have an essential role in firm performance. Firm performance improves when firms hold a certain amount of cash. However, firm performance decreases if they contain more money than the optimum level. The main reason is that managers are not able to utilize some money in proper projects. A large amount of idle cash is not efficient. Thus, firm managers must make the optimum use of cash holdings. There is a 16.68% increase in the ratio of cash to total assets in new economy firms compared to old economy firms, significant at the one percent level. Furthermore, research and development expenditure in new economy firms is 5.12% greater than old economy firms.

I find that corporate governance mechanisms (board diversity and institutional ownership) are significant predictors of cash holdings and firm performance. My results complement the findings by Dittmar et al. (2003) that firms with weak governance mechanisms prefer to hold more cash. In sub-sample analysis, firms with less than $50 billion total assets hold more money than other sized firms. There is a 0.10 % increase in cash to total assets ratio as market value increases by 10%, significant at the 1% level. There is a negative association between institutional ownership and corporate cash holdings. With higher institutional ownership, internal corporate governance improves, and a result, agency problems are reduced, and firms hold less cash. There is a positive but insignificant association between firm value and money to total assets ratio when

total assets are higher than $50 billion. The firm value increases by 3.62% when firms increase their research and development to sales ratio by 10%, significant at the 1% level.

Agency theory (Schleifer and Vishny (1997)) suggests that CEOs need independent input. We hypothesize that diverse groups of directors may have a positive impact on controlling and monitoring functions. Diversity may be one of the more useful tools to minimize agency issues. I find that firm performance improves when firms have a balanced board structure policy. I split the sample according to total assets, cash holdings to total assets, and the number of employees. Corporate cash holdings decrease in new economy firms with board diversity structure policy. This relationship is significant at a 5% significance level when the number of employees lies in the range of 65 to 100. During the financial crisis period (2007-2009), excess cash holdings help firms to improve performance. There is no significant relationship between cash and firm performance during the crisis period. These results are in opposition to those during regular business periods.

References

Amarjit Gill, Charul Shah. (2012). “Determinants of Corporate Cash Holdings: Evidence from Canada”. International Journal of Economics and Finance 4(1), 70-79.

Acharya, Viral V., Heitor Almeida, and Murillo Campello. "Is cash negative debt? A hedging perspective on corporate financial policies." Journal of financial intermediation 16.4 (2007): 515-554.

Atif, Muhammad, Benjamin Liu, and Allen Huang. "Does board gender diversity affect corporate cash holdings?" Journal of Business Finance & Accounting 46.7-8 (2019): 1003-1029.

Barclay, Michael J., and Clifford W. Smith Jr. "The maturity structure of corporate debt." *The Journal of Finance* 50.2 (1995): 609-631.

Bates, Thomas W., Kathleen M. Kahle, and René M. Stulz. "Why do US firms hold so much more cash than they used to?" The journal of finance 64.5 (2009): 1985-2021.

Blumberg, Yoni. "Companies with more female executives make more money—here’s why." Closing the Gap (2018).

Carter, David A., Betty J. Simkins, and W. Gary Simpson. "Corporate governance, board diversity, and firm value." Financial review 38.1 (2003): 33-53.

Chang, A., et al. "US corporate cash reaches $1.9 trillion but rising debt and tax reform pose risk." SP Global Platts URL https://www. Sp global. com/en/research-insights/articles/us-corporate-cash-reaches-19-trillion-but-rising-debt-and-tax-reform-pose-risk (2017).

Chen, Yenn-Ru. "Corporate governance and cash holdings: Listed new economy versus old economy firms." *Corporate Governance: An International Review* 16.5 (2008): 430-442.

Conyon, Martin J., and Lerong He. "Firm performance and boardroom gender diversity: A quantile regression approach." Journal of Business Research 79 (2017): 198-211.

Core, John E., Wayne R. Guay, and Tjomme O. Rusticus. "Does weak governance cause weak stock returns? An examination of firm operating performance and investors' expectations." *The Journal of Finance* 61.2 (2006): 655-687.

Elyasiani, Elyas, and Jingyi Jia. "Distribution of institutional ownership and corporate firm performance." Journal of banking & finance 34.3 (2010): 606-620.

Ferreira, A, Vilela, S. 2004. Why do firms hold cash? Evidence from EMU countries. *European Financial Management* 10 (2): 295– 319.

Fresard, Laurent. "Financial strength and product market behavior: The real effects of corporate cash holdings." *The Journal of finance* 65.3 (2010): 1097-1122.

Gompers, Paul, Joy Ishii, and Andrew Metrick. "Corporate governance and equity prices." *The quarterly journal of economics* 118.1 (2003): 107-156.

Hartzell, Jay C., and Laura T. Starks. "Institutional investors and executive compensation." *The journal of finance* 58.6 (2003): 2351-2374.

Huang, Winifred, and Khelifa Mazouz. "Excess cash, trading continuity, and liquidity risk." *Journal of Corporate Finance* 48 (2018): 275-291.

Jensen, M, Mackling, W. 1976. The theory of the firm: managerial behaviour, agency costs, and ownership structure. Journal of Financial Economics 3(4): 305– 360.

Jensen, MC. 1986. Agency costs of free cash flow, corporate finance, and takeovers. American Economic Review 76: 323– 329.

Martínez-Sola, Cristina, Pedro J. García-Teruel, and Pedro Martínez-Solano. "Corporate cash holding and firm value." Applied Economics 45.2 (2013): 161-170.

Murphy, Kevin J. "Stock-based pay in new economy firms." *Journal of Accounting and Economics* 34.1-3 (2003): 129-147.

Nikolov, Boris, and Toni M. Whited. "Agency conflicts and cash: Estimates from a dynamic model." The Journal of Finance 69.5 (2014): 1883-1921.

Opler, T, Pinkowitz, L, Stulz, R, Williamson, R. 1999. The determinants and implications of corporate cash holdings. Journal of Financial Economics 52: 3– 46.

Ozkan, A, Ozkan, N. 2004. Corporate cash holdings: an empirical investigation of UK companies. *Journal of Banking and Finance* 28: 2103– 2134.

Pinkowitz, Lee, René Stulz, and Rohan Williamson. "Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A crosscountry analysis." The Journal of Finance 61.6 (2006): 2725-2751.

Riddick, Leigh A., and Toni M. Whited. "The corporate propensity to save." The Journal of Finance 64.4 (2009): 1729-1766.

Schall, Lawrence D., and Charles W. Haley. "Introduction to Financial Management. MacGaw-Hill." (1991).

Shleifer, Andrei, and Robert W. Vishny. "A survey of corporate governance." The journal of finance 52.2 (1997): 737-783.

CHAPTER THREE

CEO COMPENSATION AND CASH HOLDINGS IN NEW AND OLD ECONOMY FIRMS

3.1 Introduction

Free cash flow is one of the main reasons for the agency problem (Jensen (1986). Bates (2009) observes that the agency problem associated with excess cash is overinvestment. Agency problems are related to poor acquisition choices (Harford (1999). Executives benefit from high free cash flows via perk consumption and bonuses for completion of merger deals (Grinstein and Hribar, 2004).

CEO compensation has grown 940% (under the options realized measure[1]) since 1978. Average worker compensation has risen by a mere 12% during this period. The average pay of CEOs at the top 350 firms in 2018 was $17.2 Million (Mishel and Wolfe (2019)). Stock options play an essential role in CEO compensation. CEO compensation is high relative to average worker compensation, by a ratio of 278 to 1 in 2018. The ratio was 20 to 1 in 1965 and 58 to 1 in 1989 (Mishel and Wolfe (2019)).

A quality CEO is essential for the firm. If the firm is performing well, and shareholders are benefitting, then the CEO should help as well. Most firms have given rights to shareholders to vote on executive pay. Shareholders and investors typically agree with the board decisions on compensation.

A one-dollar salary suggests that a CEO gives shareholder interests a high priority, though it is uncommon. However, they earn a significant bonus and or equity stake. For example, Sudhir

[1] Option realized measure is the payment to CEO that includes salary, bonus, and non-equity incentives earned performance shares, vested restricted stock, and the gain from stock option exercises (https://execcomp.org/Issues/Issue/pay-for-performance/realized-pay)

Steven Singh, CEO of Concur Technologies, Inc., receives a $1 salary (2014), but he earns approximately $7.8 million from restricted stock grants and long-term incentive plans. Similarly, Jeffrey H. Smulyan, CEO of Emmis Communications Corporation, received roughly $3.4 million in bonuses and only $1 from salary in 2007.

Zeng et al. (2014) empirically examine the relationship between CEO gender and corporate cash holdings among Chinese listed firms for the period from 2007 through 2011. They find those female CEOs are more concerned with the precautionary motive and less concerned with the opportunity cost of money. Han et al. (2019) investigate the relationship between CEO gender and corporate innovation behaviors. Female CEOs have significantly promoted both innovation and radical innovation behaviors relative to their male counterparts. Thus, firms and policymakers should give more importance to gender equality, and they should actively promote the selection of female CEOs in the corporate world.

Elsaid and Eahab (2014) find that a change in CEO gender from females to males relates to an increase in firm performance and a decrease in the probability of bankruptcy. Compensation differences between female and male CEOs studied extensively. Results show a significant difference between male and female CEO compensation favoring males (Adams et al. (2007)). Few female executives promote to CEO positions. There is no statistical difference in incentives between males and females' CEOs'.

Top executives may be able to convince corporate boards that more significant cash reserves mean better financial health. This behavior may increase agency problems between shareholders and managers. Executive compensation rises with weak internal governance. Furthermore, corporate social responsibility plays into cash management, with socially responsible managers more likely to carefully manage cash reserves. There are better and more effective

monitoring mechanisms when institutional ownership is high. CEO compensation tends to be lower compared to firms with lower institutional ownership.

3.2 Literature Review and Hypothesis Development

Dittmar et al. (2003) argue that agency problems may cause cash holdings in firms. I examine how the corporate cash holding's impact on total CEO compensation and the relationship between compensation and cash holdings in new and old economy firms. Bates et al. (2009) examine four reasons for excess cash holdings: transaction motive, precautionary motive, tax motive, and agency motive. The transaction motive encourages managers to hold cash to reduce transaction costs. Similarly, firms hold money for precautionary reasons, i.e., to fund payments when other sources are not available or too costly.

Financial economists have observed a relationship between cash holdings and firm characteristics (size, volatility, etc.) and CEO characteristics (CEO age, CEO gender, etc.). The literature documents that performance-based incentives mitigate the impact of agency problems regardless of the source of conflict. Dechow and Sloan (1991) recommend performance-based incentives for correcting shareholder-manager disputes.

Executives can enhance their compensation by manipulating earnings to meet performance benchmarks, especially if realized gains are near to the lower and upper limits of the firm's bonus schedule (Cheng, Harford, and Zhang (2015)). Barthala (1996) and Gomez and Wiseman (1997) find that CEOs with high ownership want to maximize guaranteed pay (i.e., salary) and minimize incentive compensation (i.e., options) as a percentage of total compensation. Bertrand and Mullainathan (2001) show that the CEO may affect the composition of the compensation committee, and therefore, compensation policy. Furthermore, the authors assume that CEO compensation is used by shareholders to mitigate agency problems.

CEOs can extract more pay from the board by using the firm's cash holding as evidence of superior performance when agency problems are present. CEO's are unable to obtain higher compensation if shareholders vote on compensation. Shareholders' voting on executive pay (SVEP) is a dummy variable equal to one if the firm has a voting policy and zero otherwise.

Hypothesis 1: As cash holdings to total assets increase, CEOs tend to extract more on total compensation.

Corporate governance research finds that large shareholders can provide better, more active monitoring. Dharwadkar et al. (2008) find a positive and significant effect of sizeable institutional ownership on governance mechanisms. Ning et al. (2015) find a positive and meaningful relationship between CEO compensation risk and institutional ownership, excluding the top five holdings. Large institutional owners can use different techniques (voting power, the election of board members, shareholder activism, etc.) to influence senior management (Cubbin and Lech (1983)). Hall and Liebman (1998) find a robust positive relationship between firm performance and CEO compensation. Liu et al. (2011) find a positive correlation between CEO incentives and cash holdings.

Hypothesis 2: CEOs in New Economy firms receive more on total compensation as compared to Old Economy firms.

Bryan et al. (2000) and Andrikopoulos (2009) posit a negative relationship between option-based compensation and leverage. Tchisty et al. (2011) find conflicting results. Firms with high say on pay (SOP) approval exhibit better performance (KimbrooKimbro, and Xu (2015)). Yarmack (1995) and Mehran (1995) fail to observe a significant relationship between CEO option-based pay and leverage. Tosun (2016) finds a change in CEO compensation with leverage changes. She identifies that option-based CEO compensation is negatively related to leverage.

Jensen and Meckling (1976) suggest that stock options align CEO interest with those of shareholders to mitigate agency problems between managers and shareholders. Chhaochharia et al. (2009) find that CEO compensation decrease if most of the board members are independent. Further, they find that the drop in compensation is from the bonus and stock-based compensation.

Hypothesis 3: CEOs in firms with a balanced board structure policy receive lower total compensation.

3.3 Data and Sample

I obtain compensation data for CEOs and top executives from ExecuComp from 2000 across 2016. ExecComp provides total compensation and the underlying components for the CEO and senior executives of S&P 1500 firms and their personal and professional characteristics such as age, tenure, and CEO-Chairman duality.

I obtain firms' financial characteristics from COMPSTAT. I collect total institutional ownership data from the FactSet Stock Ownership Summary. I exclude utilities (SIC codes 4900 – 4949) and financial firms (SIC codes 6000 – 6999) because they hold cash for different purposes than other firms. I also eliminate firms with negative assets. I Winsorize all variables at their 1st and 99th percentiles to reduce the influence of outliers.

Boards attempt to use incentives and compensation techniques to align the CEO and top executives' actions to increase shareholder wealth. Pay for performance is the rule that most firms follow to design the compensation plans to their executives and CEO. When bonuses tie to firm performance, CEOs motivate to work harder and make better decisions. Top executives act like owners when they have a stake in the firm. Stock ownership is one of the best performing drivers. I obtain information on institutional holdings from the Thomson-Reuters Institutional Holdings (13F) Database. Institutional investors who manage $100 million or more must disclose the

information. I use total institutional ownership as a percentage of market capitalization as a proxy for governance.

3.4 Research Design

I use the following regression model to test the relationship between CEO compensation and corporate cash holdings.

The regression model is:

$$(CEO\ Compensation)_{i,t} = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 R\&D_{i,t} + \beta_5 NWC_{i,t} + \beta_6 Dividend_{i,t} + \beta_7 CAPX_{i,t} + \beta_8 NEW_{i,t} + \beta_9 Aqc_{i,t} + \beta_{10} Cash\ Flow_{i,t} + \beta_{11} Sigma_{i,t} + \beta_{10} CEO\ Age_{i,t} + \beta_{11} CEOGender_{i,t} + \beta_{12} Ownership_{i,t} + \varepsilon_{i,t} \quad \text{.....1}$$

CEO compensation is dependent variables; cash and cash square are the independent variables. Institutional ownership is the total institutional ownership ratio in the percentage of market capitalization. Size, Leverage, R & D expenditures, networking capital, Dividend dummy, CEO age, and CEO gender are control variables. I expect a significant positive coefficient for β1. CEO total compensation increases as cash holdings increase, all else constant. As overall institutional ownership increases, there may be better monitoring of the firm. Firms with higher total institutional ownership indicate better transparency, lesser information asymmetry, and low agency problem.

3.5 Data Tables and Data Analysis

Table I documents the descriptive statistics of the main variables. Tdc1 (Salary+ Bonus+ Annual Grants+ Restricted Stock Grants) and Tdc2(Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) are performance-based CEO compensations. Table II shows the trend of CEO compensation, Tobin's Q, cash to total assets ratio, and total institutional ownership from 2000 to 2016. Here the average annual CEO compensation, which is the sum of salary and bonus, is $920.15 thousand us dollars. The average benefit ranges from $40 thousand to $ 3.80 million us dollars. On average, firms hold 14.73 % of

their total assets. On average, firms spend 3.25 % of their total sales on research and development activities. 11.28% of firms are new economy firms.

3.5.1 Descriptive Analysis

Table I. Descriptive Statistics. CEO compensations are in $ thousands.

Variable	Obs	Mean	Std. Dev.	Min	Max
Salary+ Bonus	6,283	920.1522	612.4667	39.667	3800
Tdc1	6,283	4622.777	4439.929	223.846	22855.37
Tdc2	6,283	5124.699	6032.747	189.1	30581.33
Tobin's Q	6,283	2.066148	1.120393	0.711076	6.993604
Cash	6,283	0.147264	0.140315	0.000882	0.742059
CAPX	6,283	0.047394	0.04209	0.002821	0.271929
Size	6,283	7.853146	1.437865	3.628458	11.56795
AQC	5,892	0.032079	0.062054	0	0.323538
Cash Flow	6,283	0.062238	0.045006	0.002019	0.244479
Leverage	6,283	0.498312	0.182375	0.093839	0.960346
NWC	6,283	0.244599	0.15801	0.004468	0.765918
R&D	6,283	0.032541	0.058448	0	0.404904
Sigma	6,283	0.600098	0.664286	0.023611	4.807853
Age	6,283	61.52427	7.563664	46	82
Gender	6,283	0.963075	0.188593	0	1
Ownership	6,283	0.824517	0.160899	0.168917	1
Dividend	6,283	0.568837	0.495278	0	1
New	6,283	0.112844	0.316427	0	1
Emp	6,257	21.75326	49.10604	1	2300

The average CEO age is 61.52 years, varying between 46 and 82 years. Female CEOs comprise 3.7 % of the total. The number of employees varies from 1 to 2300. For a better understanding of trends in CEO compensation, cash holdings to total assets ratio, Tobin's q, and institutional ownership, I study these variables by year.

Table II shows the average of each variable from 2000 through 2016. CEOs Salary cum Bonus almost remains constant. CEOs' principal payment comes from equity and option-based compensation. Thus, to receive a full refund, CEOs must increase the firm value. For example, Thomas Rutledge, CEO of Charter Communications Inc., was one of the highest-paid CEOs in 2016. His compensation was $98 million. Eighty-eight million was from stock and option awards.

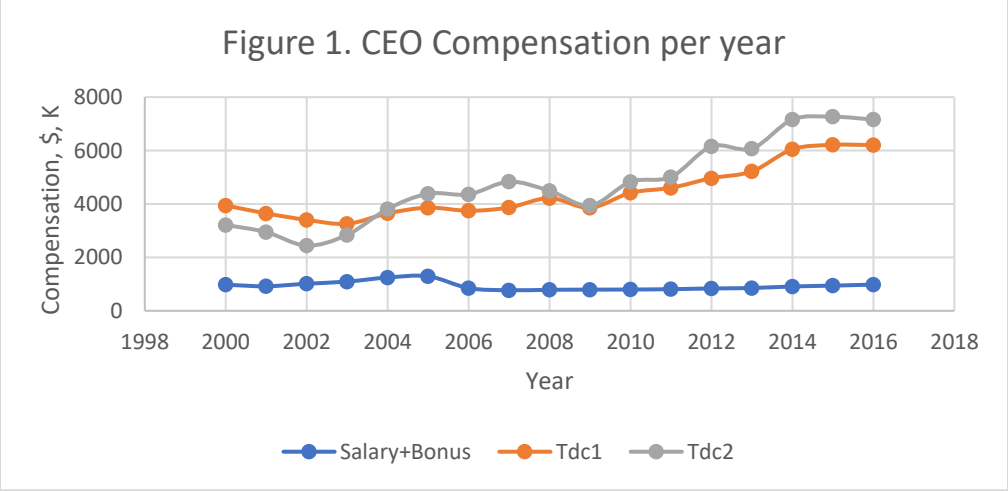
For Rutledge to receive the full amount, the Charter's share price must increase by 155% over six years.

Table II. CEO Compensation, Firm Performance, Cash, and Ownership by Year

Table II. The trend of CEO compensation, Tobin's q, Cash to total assets ratio, and Institutional ownership.

Year	Salary+ Bonus	Tdc1	Tdc2	Tobin's q	Cash	Ownership
2000	976.64	3943.98	3215.39	2.31	0.111	0.655
2001	919.56	3646.66	2946.19	2.28	0.131	0.718
2002	1014.01	3405.47	2441.41	1.89	0.144	0.756
2003	1093.74	3257.3	2843.41	2.13	0.154	0.769
2004	1245.72	3647.55	3812.91	2.17	0.166	0.803
2005	1293.31	3862.09	4383.56	2.25	0.167	0.824
2006	849.28	3745.4	4359.24	2.12	0.147	0.845
2007	770.84	3866.49	4833.03	2.05	0.135	0.855
2008	786.82	4219.56	4492.59	1.69	0.131	0.831
2009	792.58	3856.66	3941.46	1.81	0.162	0.821
2010	796.38	4419.03	4828.91	1.91	0.159	0.831
2011	809.42	4603.78	5011.4	1.82	0.148	0.835
2012	836.77	4964.62	6154.21	1.88	0.14	0.854
2013	853.21	5220.37	6075.81	2.24	0.152	0.842
2014	911.74	6046.25	7159.9	2.29	0.147	0.848
2015	942.37	6211.32	7265.5	2.14	0.14	0.853
2016	981.15	6205.74	7161.14	2.24	0.145	0.847

Figure 1 shows the CEO compensation (Salary + Bonus, Tdc1, and Tdc2) from 2000 to 2016.



Here Tdc1 (Salary+ Bonus+ Annual Grants+ Restricted Stock Grants) and Tdc2 (Salary + Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) are performance-based CEO compensation. CEOs compensation (Salary+ Bonus) slightly increase after 2005.However, equity- based and option-based compensation increase drastically after 2009.

3.5.2 Correlation Matrix

Table III presents the correlation coefficient between the variables. CEO compensation (Salary+ Bonus, Tdc1, Tdc2) has a positive correlation with Cash holdings to total assets ratio and institutional ownership.

Table III. Correlation Matrix

Variables	Salary+ Bonus	Tdc1	Tdc2	Cash	Tobin's Q	Size	R&D	Ownership
Salary+ Bonus	1							
Tdc1	0.5094	1						
Tdc2	0.421	0.7521	1					
Cash	0.01	0.0891	0.0729	1				
Tobin's Q	0.0113	0.1288	0.1815	0.3756	1			
Size	0.3048	0.5545	0.4794	0.0936	0.344	1		
R&D	0.0135	0.1761	0.142	0.474	0.2486	0.2088	1	
Ownership	0.051	0.1513	0.1598	0.1227	-0.0042	0.1257	0.1249	1

3.5.3 New and Old economy firms

New economy firms focus on high-technology equipment and consumer products, e-commerce, innovative IT-related services, high-tech telecommunications, and IT goods and services. New economy firms hold significantly more cash than old economy firms at the 1% level. Similarly, new economy firms spend more on research and development than old economy firms. Furthermore, new economy firms' cash flows are more volatile than cash flows in old economy firms.

Table IV. Main Variables at New and Old Economy Firms

Table IV. This table explains the average of the main variables and their differences in new and old economy firms. 0 represents old, and 1 represents new economy firms. CEO compensation is higher at new economy firms as compared to old economy firms. Difference=mean (0)-mean (1).

Variable	Mean (0)	Mean (1)	Difference	t-statistics	pvalue
Salary+ Bonus	$923.94K	$890.39K	$33.55 K	1.37	0.080
Tdc1	$4486.91K	$5690.97 K	-1204.06***	-6.83	0.000
Tdc2	$4980.86 K	$6255.53 K	-1274.67***	-5.31	0.000
Tobin's Q	1.987	2.686	-0.699***	-15.96	0.000
Cash	0.126	0.311	-0.185***	-36.17	0.000
R&D	0.022	0.117	-0.095***	-48.04	0.000
Age	61.69	60.21	1.48***	4.94	0.000
Sigma	0.561	0.910	-0.349***	-13.37	0.000
Ownership	0.821	0.854	-0.033***	-5.15	0.000
Dividend	0.602	0.306	0.296***	15.27	0.000
Leverage	0.506	0.432	0.074***	10.4	0.000
CAPX	0.049	0.033	0.016***	9.46	0.000
NWC	0.235	0.318	-0.083***	-13.34	0.000

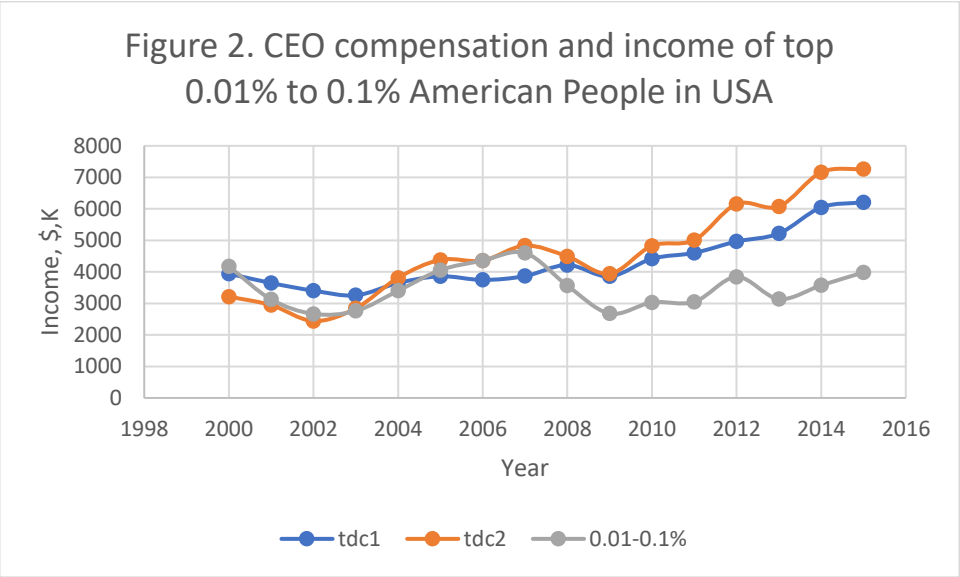
The average CEO compensation (Salary+ Bonus) in new and old economy firms is insignificant. The mean expenditures to total sales in new and old economy firms are also significant at a 1% level.

3.6 CEO Compensation

CEO base salary accounts for 20% of his/her total pay. Base salary is tied to the central role and day to day activities for running the organization smoothly. The remaining 80% comes from performance-based compensation. CEO compensation is tied to the returns they make for the shareholders. The "pay for performance" concept is used in most large public companies. CEO compensation (salary + bonus) remains almost constant. CEO incentives and compensation mainly depend on performance-based compensation. The figure 1 shows that CEO compensation (Tdc1: with options granted and Tdc2: with options realized) increases with time. However, salary + bonus remains nearly constant throughout the years 2000 through 2016.

3.6.1 Do U.S. CEOs earn more?

In 2016, the U.S. CEOs earned an average of $6.2 million (with options granted) and $7.1 million (with options realized). The mean CEO pay is 271 times the average American worker (Mishel and Schider (2017)). However, the wealthiest persons in the USA (top 0.01%) earn more than the average CEO.



The ratio of the income (including capital gains) of the top 0.01% to the pay of CEOs is approximately 6.6. In other words, the top 0.01% of American households earn 6.6 times more than the average U.S. CEO. CEO incomes are roughly comparable to the top 0.1% of American families. Figure 2 shows how the wealthiest American households (high 0.01 to 0.1%) and CEO incomes vary from 2000 through 2015.

Firm performance increases if they maintain cash balances at the optimum level. However, if they hold significantly more, performance decreases. CEO compensation (Salary + Bonus) remains nearly constant. However, stocks granted, and options realized payment depends on the cash holdings to total assets ratio—the excess cash results in weak firm performance. As a result, performance-based compensation decreases. To test the hypothesis that CEOs extract more when they hold more cash, I estimate the following model:

3.6.2 Salary and Bonus

$$(CEO\ Compensation)_{i,t} = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 R\&D_{i,t} + \beta_5 NWC_{i,t} + \beta_6 Dividend_{i,t} + \beta_7 CAPX_{i,t} + \beta_8 NEW_{i,t} + \beta_9 Aqc_{i,t} + \beta_{10} Cash\ Flow_{i,t} + \beta_{11} Industry\ Sigma_{i,t} + \beta_{10} CEO\ Age_{i,t} + \beta_{11} CEOgender_{i,t} + \beta_{12} Ownership_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots$$

Table V. Salary and Bonus and Cash Holdings

Table V. Here the dependent variable is CEO compensation (Salary+ Bonus). Robust t-statistics are in brackets.

VARIABLES	Salary+ Bonus	Salary+ Bonus	Salary+ Bonus	Salary+ Bonus	Salary+ Bonus
Cash	236.6***	293.5***	283.9***	234.9***	212.5**
	(2.708)	(3.653)	(3.542)	(3.012)	(2.503)
Size	133.1***	157.1***	153.7***	154.5***	145.4***
	(18.63)	(22.31)	(21.25)	(21.28)	(19.17)
Leverage	-25.05	96.23*	97.98**	110.8**	98.25*
	(-0.466)	(1.958)	(1.986)	(2.288)	(1.942)
R&D	-650.0***	-624.2***	-630.2***	-604.3***	-392.9**
	(-3.537)	(-3.743)	(-3.780)	(-3.703)	(-2.131)
NWC	-241.1***	-199.1***	-204.9***	-191.8***	-317.7***
	(-3.421)	(-3.001)	(-3.096)	(-2.956)	(-4.235)
Dividend	-69.87***	-61.90***	-52.74***	-44.02***	-20.37
	(-4.101)	(-3.880)	(-3.259)	(-2.766)	(-1.215)
CAPX	-1,173***	-847.9***	-839.5***	-862.0***	-995.1***
	(-6.374)	(-4.862)	(-4.801)	(-4.922)	(-4.853)
New	-46.69	-17.36	-14.70	-18.02	-8.145
	(-1.526)	(-0.617)	(-0.522)	(-0.650)	(-0.253)
AQC	0.00262	-0.00872	-0.00706	0.000983	-0.00866
	(0.102)	(-0.357)	(-0.289)	(0.0414)	(-0.371)
Cash Flow	-368.1*	-390.0**	-370.2**	-365.6**	-305.2
	(-1.915)	(-2.092)	(-1.981)	(-1.977)	(-1.595)
Sigma	-49.10***	-26.05***	-27.30***	-28.55***	41.15
	(-5.523)	(-3.092)	(-3.231)	(-3.296)	(0.282)
Age		27.90***	28.20***	25.80***	25.11***
		(24.83)	(25.04)	(22.96)	(22.29)
Gender		-138.7***	-139.6***	-147.1***	-127.2***
		(-3.261)	(-3.258)	(-3.457)	(-2.807)
Ownership			149.4***	212.3***	227.4***
			(3.346)	(4.605)	(4.760)
Constant	80.57	-1,802***	-1,920***	-1,773***	-1,377***
	(1.337)	(-16.89)	(-16.92)	(-14.99)	(-3.073)
Year Effect	NO	No	No	Yes	Yes
Industry Effect	No	No	No	Yes	Yes
Observations	5,892	5,892	5,892	5,892	5,887
R-squared	0.104	0.220	0.222	0.264	0.299

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Here, table V shows that Total CEO compensation (Salary+ Bonus) increases by 23.66 thousand dollars when cash holdings to total assets increase by 10%. It supports my hypothesis 1, i.e., CEO extracts more when firms hold more cash. In column 3, I find that total CEO compensation becomes more significant when there is a large total institutional ownership ratio in the percentage of market capitalization. When there is considerable institutional ownership, we can assume that the CEOs are more experienced and skilled.

Furthermore, I find that CEOs tend to extract more when they become older compared to younger CEOs. Younger CEOs may feel that they have more years to earn and want to do better for customers, employees, and consumers. Older CEOs may sense that they will retire soon, so they want to get more for their retirement life. It supports my second hypothesis.

Thus, Salary+ Bonus falls when firms hold more money.

Table VI. Salary and Bonus and Excess Cash Holdings

Table VI. Salary+ Bonus is the dependent variable. As firms hold more cash, their performance decreases. As a result, their Bonuses go down. Thus, Salary+ Bonus falls when firms hold more cash.

VARIABLES	Salary+ Bonus	Salary+ Bonus	Salary+ Bonus	Salary+ Bonus	Salary+ Bonus
Cash	569.1***	761.2***	742.3***	733.7***	623.0***
	(3.479)	(4.947)	(4.824)	(4.890)	(3.996)
Cash^2	-657.9**	-967.2***	-951.8***	-1,034***	-858.4***
	(-2.285)	(-3.496)	(-3.442)	(-3.888)	(-3.176)
Size	132.4***	157.1***	153.6***	154.8***	145.5***
	(18.50)	(22.32)	(21.24)	(21.36)	(19.17)
Leverage	-8.719	136.0***	138.0***	154.0***	134.2***
	(-0.161)	(2.757)	(2.791)	(3.176)	(2.647)
R&D	-640.2***	-576.2***	-581.3***	-556.6***	-347.5*
	(-3.483)	(-3.465)	(-3.498)	(-3.424)	(-1.889)
NWC	-240.1***	-176.8***	-182.0***	-166.8**	-291.4***
	(-3.409)	(-2.653)	(-2.738)	(-2.560)	(-3.889)
Dividend	-69.35***	-59.31***	-49.61***	-39.97**	-17.73
	(-4.075)	(-3.713)	(-3.055)	(-2.504)	(-1.056)
CAPX	-1,157***	-811.5***	-802.6***	-830.3***	-983.7***
	(-6.284)	(-4.675)	(-4.615)	(-4.759)	(-4.826)
New	-39.80	-10.19	-7.678	-9.888	-0.205

	(-1.292)	(-0.363)	(-0.273)	(-0.358)	(-0.00638)
AQC	0.00305	-0.00890	-0.00721	0.000743	-0.00811
	(0.119)	(-0.362)	(-0.293)	(0.0311)	(-0.346)
Cash Flow	-388.4**	-436.2**	-415.6**	-423.0**	-344.3*
	(-2.022)	(-2.344)	(-2.227)	(-2.291)	(-1.801)
Sigma	-51.35***	-29.01***	-30.25***	-31.87***	60.12
	(-5.695)	(-3.396)	(-3.538)	(-3.628)	(0.419)
Age		-23.80*	-25.67**	-30.42**	-31.09**
		(-1.871)	(-2.011)	(-2.415)	(-2.463)
Age^2		0.409***	0.427***	0.444***	0.443***
		(3.940)	(4.091)	(4.308)	(4.305)
Gender		-126.9***	-127.7***	-135.0***	-118.1***
		(-3.071)	(-3.073)	(-3.278)	(-2.677)
Ownership			157.3***	224.2***	239.4***
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	Yes	Yes
			(3.524)	(4.894)	(5.021)
Constant	56.35	-259.9	-317.2	-92.15	198.9
	(0.932)	(-0.662)	(-0.807)	(-0.235)	(0.354)
Observations	5,892	5,892	5,892	5,892	5,887
R-squared	0.105	0.225	0.226	0.269	0.303

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Excess cash holdings negatively impact compensation (salary+ bonus), and the association is significant at a 1% significance level. When firms' cash to total assets ratio increases by 1%, the CEO's compensation (salary+ bonus) increases by $7.33 thousand. If money to total assets ratio rises further, salary and bonus decrease by $10.34 thousand (Table VI, column 4). Older CEOs extract more in bonuses.

3.6.3 Salary+ Bonus+ Other Annual Grants+ Restricted Stock Grants (Tdc1)

Managers' incentives must design properly so that their interests align with the shareholders' interests. Equity-based compensation (Tdc1) is one approach to minimize the agency problem. I use the following regression model to test the CEO compensation (Tdc1) with cash holdings to total assets ratio. We use firm-specific and CEO specific characteristics as control variables.

$$(CEO\ Compensation)_{i,t} = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 R\&D_{i,t} + \beta_5 NWC_{i,t} + \beta_6 Dividend_{i,t} + \beta_7 CAPX_{i,t} + \beta_8 NEW\ Economy_{i,t} + \beta_9 Aqc_{i,t} + \beta_{10} Cash\ Flow_{i,t} + \beta_{11} Industry\ Sigma_{i,t} + \beta_{10} CEO\ Age_{i,t} + \beta_{11} CEOgender_{i,t} + \beta_{12} Ownership_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Table VII. CEO Compensation (Tdc1) and Cash Holdings

Table VII. HereTdc1 (Salary+ Bonus+ Annual Grants+ Restricted Stock Grants) is the dependent variable. Robust t-statistics are in brackets.

VARIABLES	Tdc1	Tdc1	Tdc1	Tdc1	Tdc1
Cash	1,883***	2,005***	1,867***	2,156***	2,088***
	(3.668)	(3.950)	(3.687)	(4.249)	(3.661)
Size	1,631***	1,699***	1,650***	1,598***	1,592***
	(33.75)	(34.96)	(32.18)	(30.85)	(29.46)
Leverage	1,780***	2,128***	2,153***	1,907***	1,860***
	(5.600)	(6.746)	(6.830)	(6.119)	(5.648)
R&D	2,646**	2,758**	2,671**	2,690**	3,065**
	(2.226)	(2.353)	(2.279)	(2.278)	(2.246)
NWC	-621.5	-469.1	-551.8	-846.3**	-1,259***
	(-1.575)	(-1.196)	(-1.405)	(-2.169)	(-2.677)
Dividend	-775.9***	-756.1***	-624.2***	-733.7***	-615.5***
	(-7.643)	(-7.536)	(-6.015)	(-7.153)	(-5.712)
CAPX	-3,080***	-2,238**	-2,117*	-1,798*	-9.898
	(-2.775)	(-2.037)	(-1.943)	(-1.657)	(-0.00787)
New	213.3	295.2	333.5*	273.0	240.7
	(1.127)	(1.565)	(1.768)	(1.456)	(1.122)
AQC	0.598***	0.563***	0.587***	0.556***	0.440**
	(2.754)	(2.640)	(2.761)	(2.658)	(2.135)
Cash Flow	-4,539***	-4,607***	-4,322***	-3,605***	-4,776***
	(-3.725)	(-3.765)	(-3.522)	(-2.947)	(-3.779)
Sigma	-160.6***	-90.45	-108.4*	-99.13*	328.3**
	(-2.659)	(-1.511)	(-1.819)	(-1.740)	(2.067)
Age		78.18***	82.57***	101.7***	96.09***
		(12.08)	(12.83)	(15.54)	(14.44)
Gender		-701.0***	-714.7***	-647.3**	-608.6**
		(-2.593)	(-2.692)	(-2.502)	(-2.245)
Ownership			2,150***	1,907***	1,728***
			(7.247)	(6.249)	(5.405)
Constant	-8,438***	-13,425***	-15,137***	-15,447***	-17,575***
	(-22.43)	(-20.36)	(-22.57)	(-21.49)	(-18.47)
Year effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	NO	Yes
Observations	5,892	5,892	5,892	5,892	5,887
R-squared	0.327	0.345	0.351	0.370	0.404

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, *

p<0.1

When the cash holdings to total assets ratio increases, firm performance increases. With the improved performance, CEO performance-based compensation also increases. Table VII shows that on average, CEOs' compensation (Tdc1) increases by $18.83 thousand when firms increase cash to total assets ratio by 1%. This increased compensation is significant at a 1% significance level. When we add more control variables (CEO characteristics, and institutional ownership), CEO compensation further increases by $1.25 thousand.

Furthermore, total compensation becomes more significant when I control year and industry effects. (Column 5). Similarly, CEOs of more prominent firms extract more benefits as market size increases by 1%, total compensation increases by $16.23 thousand, significantly at a 1% significance level. Institutional ownership also has a substantial relationship at a 1% significance level with total CEO compensation.

3.6.4 CEO Compensation (Salary+ Bonus+ Other Annual Grants+ Restricted Stock Grants) and excess cash holdings.

Firm performance decreases as cash holdings increase beyond optimum value. As a result, we expect that CEO compensation (Tdc1) must fall with the increase of excess cash. To test this idea, we use the following regression model.

$$(CEO\ Compensation)_{i,t} = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 {Cash_{i,t}}^2 + \beta_3 Size_{i,t} + \beta_4 Leverage_{i,t} + \beta_5 R\&D_{i,t} + \beta_6 NWC_{i,t} + \beta_7 Dividend_{i,t} + \beta_8 CAPX_{i,t} + \beta_9 NEW_{i,t} + \beta_{10} Aqc_{i,t} + \beta_{11} Cash\ Flow_{i,t} + \beta_{12} Industry\ Sigma_{i,t} + \beta_{13} Age_{i,t} + \beta_{14} {Age_{i,t}}^2 + \beta_{15} Gender_{i,t} + \beta_{16} Ownership_{i,t} + \varepsilon_{i,t} \quad \text{.....4.}$$

There is a negative association between CEO compensation (Tdc1) and excess cash holdings to total assets ratio.

Table VIII. CEO Compensation (Tdc1) and Excess Cash Holdings

Table VIII. HereTdc1 (Salary+ Bonus+ Annual Grants+ Restricted Stock Grants) is the dependent variable. Robust t-statistics are in brackets.

VARIABLES	Tdc1	Tdc1	Tdc1	Tdc1	Tdc1
Cash	4,518***	4,971***	4,716***	4,920***	4,200***
	(4.405)	(4.917)	(4.663)	(4.902)	(4.002)
Cash^2	-5,215**	-5,826***	-5,617***	-5,364***	-4,038*
	(-2.469)	(-2.794)	(-2.686)	(-2.579)	(-1.915)
Size	1,625***	1,693***	1,645***	1,593***	1,588***
	(33.62)	(34.83)	(32.12)	(30.83)	(29.39)
Leverage	1,910***	2,264***	2,293***	2,011***	1,941***
	(5.913)	(7.044)	(7.133)	(6.344)	(5.836)
R&D	2,724**	2,816**	2,747**	2,690**	3,065**
	(2.281)	(2.391)	(2.332)	(2.269)	(2.235)
NWC	-613.1	-477.8	-547.7	-878.8**	-1,216**
	(-1.551)	(-1.209)	(-1.386)	(-2.239)	(-2.572)
Dividend	-771.8***	-752.1***	-620.7***	-732.7***	-611.8***
	(-7.605)	(-7.506)	(-5.982)	(-7.142)	(-5.673)
CAPX	-2,958***	-2,092*	-1,971*	-1,711	-47.89
	(-2.657)	(-1.896)	(-1.801)	(-1.571)	(-0.0381)
New	267.9	359.2*	393.2**	334.7*	286.2
	(1.406)	(1.894)	(2.074)	(1.776)	(1.327)
Aqc	0.601***	0.568***	0.591***	0.560***	0.446**
	(2.768)	(2.658)	(2.776)	(2.677)	(2.164)
Cash Flow	-4,700***	-4,776***	-4,497***	-3,760***	-4,790***
	(-3.860)	(-3.907)	(-3.667)	(-3.081)	(-3.801)
Sigma	-178.5***	-110.7*	-127.5**	-118.1**	274.9
	(-2.946)	(-1.844)	(-2.131)	(-2.069)	(1.608)
Age		114.8	89.52	188.7***	209.3***
		(1.549)	(1.208)	(2.589)	(2.819)
Age^2		-0.283	-0.0493	-0.685	-0.891
		(-0.479)	(-0.0834)	(-1.176)	(-1.509)
Gender		-669.4**	-680.9**	-625.7**	-611.4**
		(-2.486)	(-2.575)	(-2.429)	(-2.256)
Ownership			2,130***	1,889***	1,702***
			(7.106)	(6.139)	(5.289)
Constant	-8,630***	-14,830***	-15,605***	-18,283***	-20,887***
	(-22.43)	(-6.354)	(-6.815)	(-8.044)	(-9.202)
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	No	Yes
Observations	5,892	5,892	5,892	5,892	5,887
R-squared	0.328	0.346	0.352	0.371	0.405

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, *
p<0.1

When cash holdings to total assets ratio beyond the optimum level increase by 1%, CEO compensation decreases by $52.15 thousand annually (Table VIII). There is no significant

relationship between CEO age square and total compensation. We already find that firm performance improves with the increase in institutional ownership. Thus, CEO extracts more when overall institutional ownership increases.

Table IX. CEO Compensation (Tdc2) and Firm's Performance

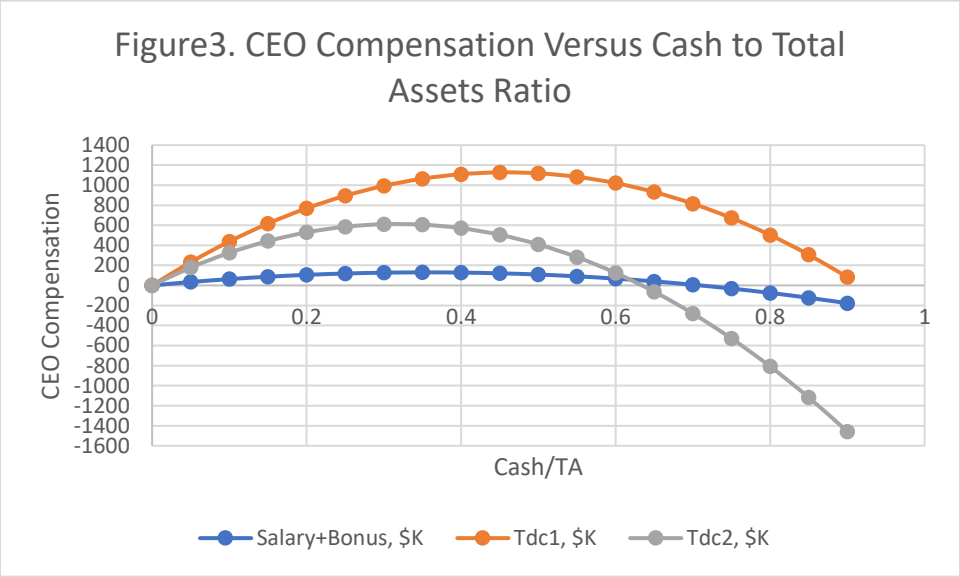
Table IX. HereTdc2 (Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) is the dependent variable. Robust t-statistics are in brackets.

VARIABLES	Tdc2	Tdc2	Tdc2	Tdc2	Tdc2
Tobin's Q	56.29	39.48	123.6	231.9	226.0
	(0.552)	(0.393)	(1.228)	(1.486)	(1.398)
Cash	3,044**	3,865***	3,379**	2,392	1,882
	(2.135)	(2.755)	(2.404)	(1.202)	(0.911)
Cash^2	-5,003*	-6,094**	-5,792**	-1,170	-379.5
	(-1.740)	(-2.165)	(-2.045)	(-0.294)	(-0.0951)
Size	1,872***	1,976***	1,870***	1,795***	1,826***
	(27.15)	(28.04)	(25.49)	(15.81)	(15.39)
Leverage	1,949***	2,489***	2,526***	2,378***	2,392***
	(4.273)	(5.515)	(5.625)	(3.469)	(3.287)
R&D	2,972	3,113*	2,821	795.4	1,894
	(1.600)	(1.686)	(1.543)	(0.345)	(0.743)
NWC	-673.1	-499.8	-665.5	-1,181	-1,425
	(-1.188)	(-0.889)	(-1.188)	(-1.300)	(-1.342)
Dividend	-823.5***	-786.7***	-556.5***	-709.3***	-594.5**
	(-5.415)	(-5.225)	(-3.621)	(-2.809)	(-2.295)
CAPX	-5,811***	-4,357***	-4,298***	-2,691	-1,852
	(-3.727)	(-2.838)	(-2.820)	(-1.276)	(-0.815)
New	293.9	434.4	477.6*	374.1	391.6
	(1.033)	(1.534)	(1.690)	(0.912)	(0.843)
AQC	0.549*	0.497*	0.565*	0.200	0.137
	(1.838)	(1.693)	(1.946)	(0.760)	(0.526)
Cash Flow	5,461**	5,527**	5,094**	7,254***	6,662***
	(2.433)	(2.471)	(2.272)	(2.813)	(2.578)
Sigma	-212.9***	-120.5	-151.5*	-92.79	661.0
	(-2.711)	(-1.533)	(-1.939)	(-0.720)	(1.108)
Age		118.5***	126.2***	195.5***	186.5***
		(11.67)	(12.49)	(11.22)	(10.92)
Gender		-499.1*	-520.2*	-146.6	-283.3
		(-1.649)	(-1.777)	(-0.312)	(-0.579)
Ownership			3,871***	912.3	611.7
			(9.520)	(1.452)	(0.929)
Constant	-10,429***	-18,558***	-21,556***	-25,379***	-29,661***
	(-18.78)	(-18.48)	(-20.56)	(-14.60)	(-13.89)
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	No	Yes
Observations	5,892	5,892	5,892	5,892	5,887
R-squared	0.239	0.261	0.272	0.29	0.32
Number of gvkey				1,055	1,054

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table IX shows that CEO compensation increases with cash holdings. We already find a negative relationship between firm performance and excess cash. Thus, performance-based compensation decreases with excess cash. The performance-based incentives direct CEOs to increase the firms' value. This technique minimizes the agency problem too.

Figure 3. shows the graph between cash to total assets ratio and CEO Compensation. The trend indicates that CEO compensation first increases and then decreases with the cast to total assets ratio. I plot the graph using the regression output from Table VI (Column 4), Table VIII (Column 4), and Table IX (Column 2). When cash to total asset ratios are 0.40, 0.45, and 0.30, the CEO compensation (Salary and Bonus, Tdc1, and Tdc2) is maximum. Thus, the CEO must use the cash appropriately for its maximum benefits.



3.6.5 CEO Compensation (Tdc2) and Institutional ownership

I use the regression model 2 and 3 to test whether there is any impact of cash holdings and excess cash holdings to total CEO compensation (Tdc2). Here Tdc2 represents Salary+ Bonus+ Other Annual+ restricted Grants+ LTIP+ All other+ Value of Options Exercised).

Table X. CEO Compensation (Tdc2) Total Institutional Ownership

Table X. Here Tdc2 (Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) is the dependent variable.

VARIABLES	Tdc2	Tdc2	Tdc2	Tdc2	Tdc2
Cash	572.2	817.9	572.7	1,074	1,395*
	(0.802)	(1.161)	(0.817)	(1.539)	(1.748)
Size	1,890***	1,991***	1,905***	1,791***	1,802***
	(27.65)	(28.57)	(26.39)	(24.86)	(24.16)
Leverage	1,825***	2,336***	2,381***	2,082***	1,967***
	(4.086)	(5.279)	(5.412)	(4.823)	(4.172)
R&D	2,986	3,089*	2,935	3,274*	4,077**
	(1.617)	(1.682)	(1.613)	(1.829)	(2.008)
NWC	-670.5	-498.3	-645.0	-1,140**	-1,838***
	(-1.183)	(-0.887)	(-1.153)	(-2.050)	(-2.716)
Dividend	-822.8***	-788.8***	-555.0***	-785.3***	-576.4***
	(-5.476)	(-5.300)	(-3.631)	(-5.176)	(-3.579)
CAPX	-5,827***	-4,447***	-4,232***	-3,495**	-2,704
	(-3.725)	(-2.881)	(-2.759)	(-2.298)	(-1.437)
New	256.5	380.4	448.3	345.2	299.8
	(0.917)	(1.363)	(1.608)	(1.260)	(0.960)
AQC	0.529*	0.481	0.523*	0.466	0.310
	(1.776)	(1.644)	(1.809)	(1.637)	(1.084)
Cash Flow	6,255***	6,164***	6,669***	7,855***	6,843***
	(3.251)	(3.183)	(3.447)	(4.069)	(3.438)
Sigma	-196.1**	-99.68	-131.5*	-112.1	126.4
	(-2.499)	(-1.272)	(-1.687)	(-1.521)	(0.264)
Age		117.8***	125.5***	167.3***	162.3***
		(11.61)	(12.44)	(16.22)	(15.63)
Gender		-538.9*	-563.2*	-426.0	-406.1
		(-1.780)	(-1.925)	(-1.513)	(-1.362)
Ownership			3,814***	2,799***	2,559***
			(9.527)	(6.772)	(5.787)
Constant	-10,287***	-18,274***	-21,310***	-23,115***	-26,661***
	(-18.68)	(-18.16)	(-20.33)	(-20.98)	(-20.31)
Year Effect	No	No	No	Yes	Yes
Industry effect	No	No	No	No	Yes
Observations	5,892	5,892	5,892	5,892	5,887
R-squared	0.239	0.260	0.271	0.299	0.329

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, *
p<0.1

Table X shows that CEO compensation (Tdc2) increases with the increase of the total institutional ownership. CEO compensation increases by $38.14 thousand when the institutional ownership increases by 1%. This result is significant at a 1% significance level. The positive and meaningful relationship between cash holdings and CEO compensation vanishes with the value of options exercised. However, there is a positive association at the 1% significance level between compensation (Tdc2) and cash holdings when we control for CEO characteristics and total institutional ownership, as shown in table X, column 5.

Table XI. CEO Compensation (Tdc2) and CEO Age and Gender

Table XI. Here Tdc2 (Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) is the dependent variable.

VARIABLES	Tdc2	Tdc2	Tdc2	Tdc2	Tdc2
Cash	3,057**	3,877***	3,419**	3,175**	2,455*
	(2.144)	(2.767)	(2.439)	(2.285)	(1.676)
Cash^2	-4,916*	-6,100**	-5,726**	-4,148	-2,065
	(-1.715)	(-2.182)	(-2.038)	(-1.481)	(-0.720)
Size	1,885***	1,986***	1,901***	1,788***	1,800***
	(27.51)	(28.40)	(26.29)	(24.77)	(24.09)
Leverage	1,947***	2,511***	2,562***	2,187***	2,019***
	(4.272)	(5.529)	(5.674)	(4.951)	(4.221)
R&D	3,058*	3,221*	3,098*	3,324*	4,100**
	(1.648)	(1.745)	(1.694)	(1.849)	(2.012)
NWC	-662.7	-463.0	-588.4	-1,132**	-1,807***
	(-1.169)	(-0.820)	(-1.047)	(-2.026)	(-2.658)
Dividend	-819.0***	-781.1***	-545.5***	-780.5***	-573.5***
	(-5.438)	(-5.231)	(-3.551)	(-5.115)	(-3.545)
CAPX	-5,712***	-4,271***	-4,055***	-3,412**	-2,713
	(-3.644)	(-2.760)	(-2.637)	(-2.239)	(-1.442)
New	308.0	440.9	501.8*	388.9	322.1
	(1.093)	(1.571)	(1.789)	(1.411)	(1.026)
AQC	0.532*	0.484*	0.525*	0.468	0.313
	(1.786)	(1.653)	(1.814)	(1.644)	(1.094)
Cash Flow	6,103***	5,953***	6,454***	7,705***	6,817***
	(3.181)	(3.088)	(3.351)	(4.012)	(3.437)
Sigma	-212.9***	-120.1	-150.3*	-126.4*	115.0
	(-2.709)	(-1.526)	(-1.919)	(-1.711)	(0.235)
Age		48.01	2.648	157.9	178.0
		(0.413)	(0.0230)	(1.365)	(1.482)
Age^2		0.557	0.977	0.0750	-0.123
		(0.591)	(1.045)	(0.0799)	(-0.127)

Gender		-493.6	-514.2*	-401.0	-402.4
		(-1.635)	(-1.766)	(-1.429)	(-1.348)
Ownership			3,820***	2,801***	2,555***
			(9.368)	(6.672)	(5.690)
Constant	-10,467***	-16,424***	-17,814***	-22,969***	-27,156***
	(-18.62)	(-4.606)	(-5.127)	(-6.555)	(-7.885)
Year Effect	No	No	No	Yes	Yes
Industry effect	No	No	NO	No	Yes
Observations	5,892	5,892	5,892	5,892	5,887
R-squared	0.239	0.261	0.271	0.300	0.329

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, *
p<0.1

Table XI shows a negative relationship between CEO compensation (Tdc2) and cash squared, with results significant at the 5% level (Columns 2 and 3). It indicates that as firm performance declines with extra cash holdings, performance-based compensation decreases. However, when we add institutional ownership, the negative relationship between Tdc2 and Cash squared is not significant. Controlling with the year and industry effects also improve the regression results. Similarly, there is no significant impact of age and age square on CEO compensation. However, on average, female CEOs receive $524.2 thousand more in the option-based compensation.

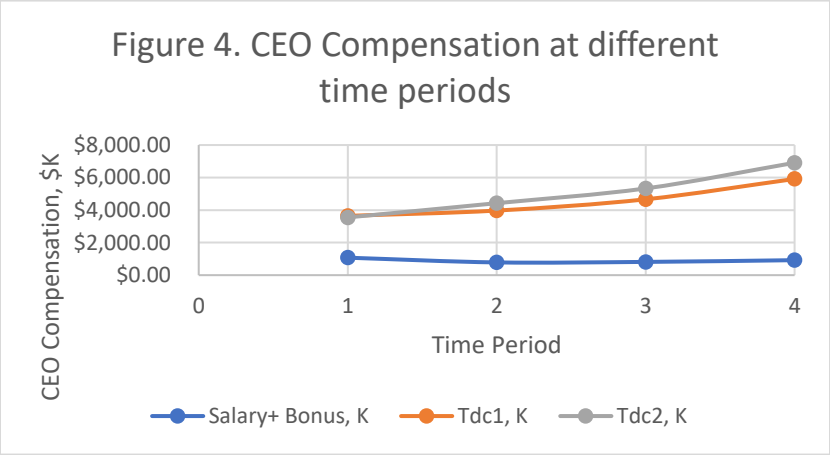
3.6.6 CEO Compensation at different time periods

CEO (Salary+ Bonus) decreases, but equity and option awards-based compensation increase during the financial crisis (2007-2009). On average, CEOs extract $783.16 as a salary and bonus during the crisis time (2007-2009).

Table XII. CEO Compensation at different time periods

Period	Salary+ Bonus, K	Tdc1, K	Tdc2, K
2000-2006	$1,073.36	$3,644.77	$3,550.78
2007-2009	$783.16	$3,971.32	$4,424.43
2010-2013	$814.25	$4,663.40	$5,331.64
2013-2016	$921.06	$5,913.81	$6,908.47
2000-2016	$920.15	$4,622.78	$5,124.70

Although Salary and Bonus decreases, equity and option-based compensation increases during the financial crisis period. Table XIII explains how excess cash holdings to total assets affect CEOs' compensation (Salary+ Bonus). As firms hold more cash, their performance decreases. As a result, performance-based compensation goes down. For a 10% increase in money to total assets ratio, on average, Salary plus Bonus decreases by $143.8 thousand, which is significant at the 1% level.



Here, 1, 2,3, and 4 represents time-period 2000-2006, 2007-2009, 2010-2012, and 2013-2016 respectively. As shown in Figure 4, Salary and Bonus slightly decrease in the Financial crisis period. However, it almost remains constant most of the time. Equity-based and option-based compensations increase constantly.

Table XIII. Salary and Bonus by Time Periods

Table XIII. Here Salary+ Bonus is the dependent variable. This table examines the relationship between CEO compensation and Cash holdings to total assets ratio during different periods.

VARIABLES	Salary+ Bonus 2000-2006	Salary+ Bonus 2007-2009	Salary+ Bonus 2010-2012	Salary+ Bonus 2013-2016	Salary+ Bonus 2000-2016
Cash	1,290***	729.6**	-272.1	440.2*	623.0***
	(4.283)	(2.245)	(-0.718)	(1.886)	(3.996)
Cash^2	-985.0*	-1,438***	-179.3	-1,137***	-858.4***
	(-1.849)	(-2.800)	(-0.282)	(-3.205)	(-3.176)
Size	188.1***	130.3***	120.3***	127.4***	145.5***
	(11.43)	(8.582)	(8.322)	(9.624)	(19.17)
Leverage	421.6***	-59.31	33.92	75.03	134.2***
	(3.786)	(-0.564)	(0.344)	(0.876)	(2.647)

R&D	557.5	-717.8*	-325.0	-661.6**	-347.5*
	(1.283)	(-1.845)	(-0.856)	(-2.494)	(-1.889)
NWC	-370.5**	-181.4	-180.2	-297.8**	-291.4***
	(-2.091)	(-1.273)	(-1.260)	(-2.438)	(-3.889)
Dividend	40.76	-71.80**	-28.59	-13.75	-17.73
	(1.189)	(-2.282)	(-0.834)	(-0.466)	(-1.056)
CAPX	-1,056***	-1,398***	-562.3	-802.0**	-983.7***
	(-2.781)	(-3.077)	(-1.440)	(-2.241)	(-4.826)
New	-114.8	25.49	88.76	61.02	-0.205
	(-1.534)	(0.316)	(1.232)	(1.501)	(-0.00638)
AQC	0.126	-0.0467	0.0300	-0.0471**	-0.00811
	(1.429)	(-1.204)	(0.612)	(-1.964)	(-0.346)
Cash Flow	-236.8	-1,086***	282.0	-674.6**	-344.3*
	(-0.614)	(-2.827)	(0.647)	(-2.332)	(-1.801)
Sigma	-175.8	40.15*	-1,894***	263.7***	60.12
	(-0.548)	(1.710)	(-3.795)	(12.72)	(0.419)
Age	16.71	-3.849	-31.59	1.908	-31.09**
	(0.551)	(-0.163)	(-1.070)	(0.0863)	(-2.463)
Age^2	0.148	0.221	0.426*	0.110	0.443***
	(0.634)	(1.178)	(1.735)	(0.589)	(4.305)
Gender	-222.2**	-9.593	22.75	-239.3***	-118.1***
	(-2.420)	(-0.123)	(0.351)	(-2.624)	(-2.677)
Ownership	322.0***	-38.49	24.75	31.88	239.4***
	(3.476)	(-0.374)	(0.242)	(0.368)	(5.021)
Constant	-2,390**	-1,031	1,134	-288.7	198.9
	(-2.376)	(-1.423)	(1.436)	(-0.419)	(0.354)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
Observations	1,767	1,007	1,278	1,835	5,887
R-squared	0.406	0.366	0.262	0.280	0.303

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table XIV. CEO Compensation (Tdc1) by Time Periods

Table XIV. Here Tdc1 (Salary+ Bonus+ Annual Grants+ Restricted Stock Grants) is the dependent variable. This table examines the relationship between CEO compensation and Cash holdings to total assets ratio during different periods.

VARIABLES	Tdc1 2000-2006	Tdc1 2007-2009	Tdc1 2010-2012	Tdc1 2013-2016	Tdc1 2000-2016
Cash	3,532*	3,565	4,700**	4,075**	4,200***
	(1.820)	(1.630)	(2.287)	(2.076)	(4.002)
Cash^2	-1,905	-2,256	-6,827*	-6,274*	-4,038*
	(-0.462)	(-0.476)	(-1.935)	(-1.739)	(-1.915)
Size	1,321***	1,352***	1,684***	1,864***	1,588***
	(11.88)	(9.719)	(15.82)	(20.94)	(29.39)
Leverage	1,243*	1,225	1,270*	3,447***	1,941***
	(1.866)	(1.607)	(1.832)	(5.218)	(5.836)
R&D	11,579***	1,719	-3,439	1,451	3,065**

	(3.881)	(0.562)	(-1.441)	(0.600)	(2.235)
NWC	-421.5	-2,360**	-875.7	-999.3	-1,216**
	(-0.425)	(-2.403)	(-0.905)	(-1.139)	(-2.572)
Dividend	-609.8***	-658.4***	-863.2***	-352.8*	-611.8***
	(-3.016)	(-2.657)	(-3.930)	(-1.669)	(-5.673)
CAPX	-910.3	-4,702*	2,051	3,701	-47.89
	(-0.413)	(-1.889)	(0.782)	(1.440)	(-0.0381)
NEW	236.7	-460.9	523.5	860.3**	286.2
	(0.471)	(-1.028)	(1.302)	(2.334)	(1.327)
AQC	0.498	0.147	0.344	0.554*	0.446**
	(0.830)	(0.241)	(0.903)	(1.898)	(2.164)
Cash Flow	-4,912**	-4,907**	-633.7	-6,997***	-4,790***
	(-2.046)	(-1.991)	(-0.208)	(-3.035)	(-3.801)
Sigma	6,838***	492.7***	3,651	-374.0**	274.9
	(4.272)	(3.392)	(1.590)	(-2.263)	(1.608)
Age	419.7**	264.0	213.2	117.9	209.3***
	(2.573)	(1.589)	(1.537)	(0.742)	(2.819)
Age^2	-2.313*	-1.396	-0.811	-0.365	-0.891
	(-1.866)	(-1.066)	(-0.727)	(-0.278)	(-1.509)
Gender	-462.5	-349.0	109.6	-1,522***	-611.4**
	(-1.301)	(-0.531)	(0.218)	(-3.223)	(-2.256)
Ownership	977.6	1,812***	2,173***	3,182***	1,702***
	(1.582)	(2.911)	(3.136)	(4.669)	(5.289)
Constant	-26,963***	-20,970***	-22,782***	-19,728***	-20,887***
	(-4.916)	(-4.154)	(-5.860)	(-4.098)	(-9.202)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
Observations	1,767	1,007	1,278	1,835	5,887
R-squared	0.342	0.449	0.413	0.477	0.405

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CEO compensation (Tdc1) has a positive and negative relationship with cash and cash squared, respectively. However, this relationship is not significant during 2007 through 2009 period.

Table XV. CEO Compensation (Tdc2) by Time Periods

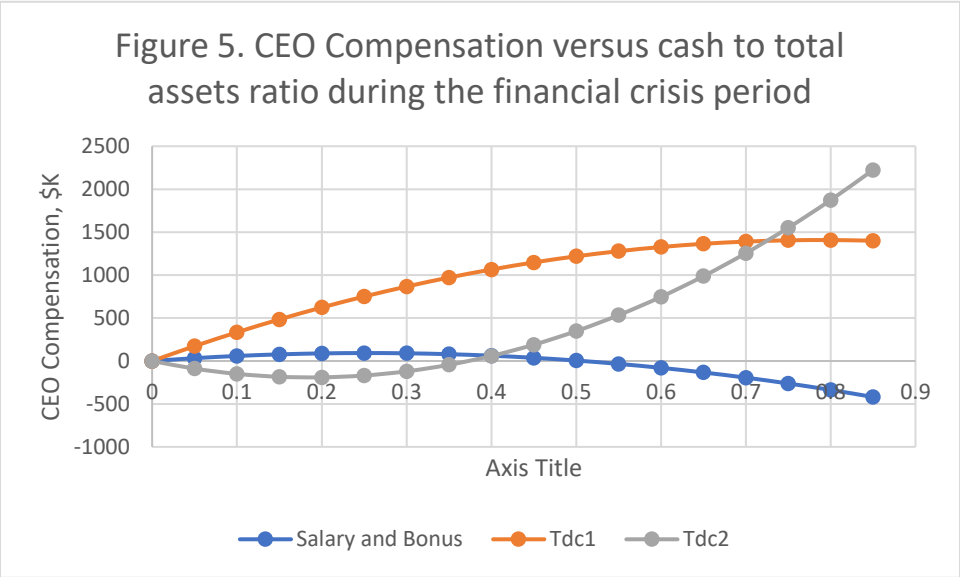
Table XV. Here Tdc2 (Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) is the dependent variable.

VARIABLES	Tdc2 2000-2006	Tdc2 2007-2009	Tdc2 2010-2012	Tdc2 2013-2016	Tdc2 2000-2016
Cash	1,760	-2,047	2,927	4,176	2,455*
	(0.767)	(-0.601)	(0.770)	(1.494)	(1.676)
Cash^2	1,164	5,486	-1,650	-10,292**	-2,065
	(0.255)	(0.859)	(-0.206)	(-2.031)	(-0.720)
Size	1,376***	1,676***	1,912***	2,187***	1,800***
	(10.19)	(8.967)	(11.20)	(16.55)	(24.09)
Leverage	-683.7	-36.12	-112.9	5,477***	2,019***
	(-0.862)	(-0.0317)	(-0.108)	(5.441)	(4.221)
R&D	2,402	-529.2	-4,707	11,959***	4,100**
	(0.765)	(-0.121)	(-1.048)	(2.910)	(2.012)
NWC	-541.5	-1,155	-2,741*	-1,644	-1,807***
	(-0.420)	(-0.761)	(-1.748)	(-1.345)	(-2.658)
Dividend	-234.9	-968.4**	-940.0***	-243.5	-573.5***
	(-0.823)	(-2.372)	(-2.721)	(-0.757)	(-3.545)
CAPX	-1,411	-5,976	-5,068	3,531	-2,713
	(-0.488)	(-1.462)	(-1.261)	(0.810)	(-1.442)
New	-649.4	-212.5	1,765**	867.8	322.1
	(-0.990)	(-0.336)	(2.557)	(1.572)	(1.026)
AQC	0.420	0.467	0.314	-0.112	0.313
	(0.583)	(0.625)	(0.578)	(-0.248)	(1.094)
Cash Flow	1,926	1,304	9,563*	8,949**	6,817***
	(0.600)	(0.319)	(1.840)	(2.295)	(3.437)
Sigma	3,457*	690.4**	4,989	-1,188***	115.0
	(1.870)	(2.486)	(1.559)	(-4.523)	(0.235)
Age	-18.51	226.3	361.0	332.9	178.0
	(-0.0747)	(0.749)	(1.615)	(1.400)	(1.482)
Age^2	1.479	-0.590	-1.543	-1.526	-0.123
	(0.765)	(-0.241)	(-0.845)	(-0.775)	(-0.127)
Gender	62.96	236.8	70.18	-1,574***	-402.4
	(0.154)	(0.345)	(0.115)	(-2.915)	(-1.348)
Ownership	1,451*	2,150**	3,082***	5,662***	2,555***
	(1.791)	(2.098)	(3.106)	(6.035)	(5.690)
Constant	-14,703*	-24,902***	-31,609***	-34,348***	-27,156***
	(-1.859)	(-2.955)	(-5.085)	(-4.770)	(-7.885)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
Observations	1,767	1,007	1,278	1,835	5,887
R-squared	0.285	0.332	0.337	0.396	0.329

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CEO compensation with the value of the option exercise has no significant relationship with cash and cash squared. During the financial crisis period, CEOs' compensation has a positive relationship with money squared.



As shown in Figure 5, when firms hold cash to total assets ratio of more than 40%, CEO compensation (Tdc2) increases during the financial period. However, salary and bonus decrease if they hold more than 40% cash to total assets ratio. Equity-based compensation (Tdc1) increases with money to total assets ratio. There is no significant relationship between CEO compensation at new and old economy firms.

$$\log(Tdc1)_{i,t} = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 Size_{i,t} + \beta_3 Leverage_{i,t} + \beta_4 R\&D_{i,t} + \beta_5 NWC_{i,t} + \beta_6 Dividend_{i,t} + \beta_7 CAPX_{i,t} + \beta_8 NEW_{i,t} + \beta_9 Aqc_{i,t} + \beta_{10} Cash\ Flow_{i,t} + \beta_{11} Sigma_{i,t} + \beta_{10} Age_{i,t} + \beta_{11} Gender_{i,t} + \beta_{12} Ownership_{i,t} + \varepsilon_{i,t} \quad \text{.....5}$$

Table XVI. Log CEO Compensation (Tdc1) and Cash Holdings

Table XVI. Here log (Tdc1) is the dependent variable.

VARIABLES	Log Tdc1	Log Tdc1	Log Tdc1	Log Tdc1	Log Tdc1
Cash	0.307***	0.344***	0.260**	0.348***	0.353***
	(2.667)	(3.041)	(2.379)	(3.226)	(2.840)
Size	0.389***	0.403***	0.376***	0.356***	0.350***
	(43.45)	(44.74)	(41.69)	(40.16)	(37.64)
Leverage	0.599***	0.663***	0.683***	0.617***	0.638***
	(9.041)	(10.11)	(10.57)	(9.670)	(9.470)
R&D	0.437*	0.441*	0.404*	0.450**	0.559**
	(1.909)	(1.948)	(1.836)	(2.028)	(2.227)
NWC	-0.0548	-0.0327	-0.0724	-0.171**	-0.294***
	(-0.599)	(-0.361)	(-0.824)	(-1.979)	(-2.806)
Dividend	-0.187***	-0.184***	-0.109***	-0.149***	-0.118***
	(-8.193)	(-8.181)	(-4.916)	(-6.875)	(-5.285)
CAPX	-1.688***	-1.526***	-1.453***	-1.296***	-0.609**
	(-6.182)	(-5.759)	(-5.736)	(-5.216)	(-2.077)
New	0.0582	0.0782**	0.0989***	0.0812**	0.0726*
	(1.506)	(2.043)	(2.679)	(2.210)	(1.709)
AQC	1.21e-05	4.68e-06	1.78e-05	8.94e-06	-1.48e-05
	(0.428)	(0.167)	(0.661)	(0.345)	(-0.573)
Cash Flow	-0.999***	-1.003***	-0.848***	-0.600**	-0.736***
	(-3.618)	(-3.622)	(-3.115)	(-2.244)	(-2.701)
Sigma	-0.0270*	-0.0113	-0.0214	-0.0179	0.0339
	(-1.654)	(-0.705)	(-1.360)	(-1.245)	(0.865)
Age		0.0557***	0.0411**	0.0704***	0.0753***
		(3.339)	(2.511)	(4.441)	(4.714)
Gender		-0.205***	-0.210***	-0.187***	-0.145***
		(-3.614)	(-3.910)	(-3.629)	(-2.727)
Ownership			1.211***	1.069***	1.073***
			(18.68)	(16.38)	(16.01)
Constant	4.877***	2.655***	2.216***	1.268**	0.965*
	(65.55)	(4.997)	(4.226)	(2.498)	(1.885)
Year Effect	No	No	No	Yes	Yes
Industry Effect	No	No	No	No	Yes
Observations	5,890	5,890	5,890	5,890	5,885
R-squared	0.368	0.386	0.426	0.461	0.494

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

With all other variables constant, if cash to total asset ratio is increased by 10%, i.e., by 0.10, we expect CEO compensation (Tdc1) to increase by 3.53%. This increase in remuneration is statistically significant at the 1% level. Similarly, if firms increase research and development expenditures by 10%, we expect CEO compensation (Tdc1) to increase by 5.59%, significant at

the 5% level. Furthermore, CEOs in new economy firms extract more compensation than CEOs in old economy firms by 9.89%.

3.6.7 CEO compensation and balanced board structure policy

Balanced board structure policy (BBP) is a dummy variable equals one if the firms' practices board diversity policy and zero otherwise.

Table XVII. CEO Compensation (Tdc2) and Balanced Board Structure Policy (BBP)

Table XVII. Here Tdc2 (Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) is the dependent variable

VARIABLES	Tdc2	Tdc2	Tdc2	Tdc2	Tdc2
Tobin's q	327.6	288.1	383.9	337.5	425.2
	(0.900)	(0.791)	(1.024)	(0.923)	(1.140)
Size	2,534***	2,534***	2,611***	2,463***	2,540***
	(7.162)	(7.151)	(7.369)	(6.828)	(7.041)
AQC	0.637	0.544	0.634	0.753	0.854
	(0.653)	(0.555)	(0.639)	(0.699)	(0.782)
Leverage	2,697	3,077*	2,712	3,309*	2,939
	(1.612)	(1.814)	(1.557)	(1.849)	(1.607)
Sigma	15,997***	14,599***	8,637	15,154***	9,365*
	(2.691)	(2.623)	(1.596)	(2.662)	(1.692)
CAPX	1,976	734.8	-115.1	1,896	1,119
	(0.199)	(0.0739)	(-0.0116)	(0.189)	(0.112)
Cash Flow	5,812*	6,018*	4,949	5,733	4,777
	(1.670)	(1.704)	(1.384)	(1.592)	(1.306)
R&D	-4,269	-3,504	-6,100	-4,650	-7,193
	(-0.933)	(-0.773)	(-1.270)	(-1.040)	(-1.507)
New	-834.6	-88.93	-136.6	-142.5	-192.1
	(-0.573)	(-0.0614)	(-0.0970)	(-0.0985)	(-0.136)
Age		138.7**	134.6**	124.3**	121.2**
		(2.478)	(2.443)	(2.242)	(2.213)
Gender		494.3	404.1	1,546	1,560
		(0.384)	(0.313)	(1.462)	(1.468)
Ownership					7,009***
					(3.181)
BBP				-1,092	-1,060
				(-1.630)	(-1.598)
Constant	-28,103***	-37,178***	-41,270***	-36,480***	-40,681***
	(-8.447)	(-7.337)	(-7.945)	(-7.207)	(-7.764)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
R-Squared	0.27	0.28	0.3	0.29	0.3
Observations	1,212	1,212	1,212	1,175	1,175
Number of gvkey	301	301	301	296	296

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The global trend today is to make the board more diverse. Diversity enriches an organization by bringing different ideas and life experiences to generate robust outcomes. It helps to extend the business into new markets. The variety correlates with increases in sales revenues, more significant market share, more customers, and higher profits.

Srinidhi et al. (2011) find higher quality earnings with gender-diverse boards. Bugeja et al. (2016) find that the compensation committee's gender diversity is negatively associated with CEO compensation. Female directors attend meetings more actively and raise more questions and issues that help to generate new ideas, thereby improving performance. I find a negative relationship between balanced board structure policy (BBP) and CEO compensation (Tdc2).

3.6.8 Shareholders' voting rights on executive's pay and CEO Compensation

SVEP is a dummy variable equals one if firms have shareholder voting on executive pay (SVEP), and zero otherwise. Correa and Lela (2016) study firms from 38 countries for the period 2001-2012. They find that CEO total compensation declines with a say-on-pay (SOP) policy. Firms with high SOP approval exhibit better performance (Kimbro and Xu (2015)).

Table XVIII. CEO Compensation (Tdc2) and Shareholder's Voting Rights on Executive's pay

Table XVIII. Here Tdc2 (Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised) is the dependent variable.

VARIABLES	Tdc2	Tdc2	Tdc2	Tdc2	Tdc2
Tobin's Q	329.9	287.0	388.7	337.5	571.8
	(0.913)	(0.792)	(1.039)	(0.923)	(1.378)
Size	2,530***	2,536***	2,599***	2,463***	2,407***
	(7.189)	(7.190)	(7.375)	(6.828)	(5.745)
AQC	0.640	0.543	0.639	0.753	0.981
	(0.656)	(0.554)	(0.645)	(0.699)	(0.588)
Leverage	2,672	3,076*	2,671	3,309*	3,464
	(1.601)	(1.814)	(1.531)	(1.849)	(1.536)
Sigma	16,058***	14,593***	8,897*	15,154***	-1,549
	(2.707)	(2.627)	(1.651)	(2.662)	(-0.188)
CAPX	2,003	721.1	-31.27	1,896	621.7

	(0.202)	(0.0727)	(-0.00316)	(0.189)	(0.0484)
Cash Flow	5,765*	6,039*	4,828	5,733	9,147
	(1.672)	(1.721)	(1.361)	(1.592)	(1.081)
R&D	-4,337	-3,448	-6,290	-4,650	-3,443
	(-0.957)	(-0.768)	(-1.311)	(-1.040)	(-0.458)
New	-823.3	-106.5	-69.80	-142.5	-1,056
	(-0.567)	(-0.0739)	(-0.0498)	(-0.0985)	(-0.196)
Age		138.7**	136.4**	124.3**	77.97
		(2.482)	(2.480)	(2.242)	(1.442)
Gender		494.4	407.6	1,546	983.0
		(0.384)	(0.316)	(1.462)	(0.727)
Ownership					8,645***
					(2.750)
BBP				-1,092	-1,788**
				(-1.630)	(-2.019)
SVEP					2,349
					(1.201)
New*SVEP					1,286
					(0.252)
Constant	-28,084***	-37,180***	-41,262***	-36,480***	-29,694***
	(-8.450)	(-7.339)	(-7.945)	(-7.207)	(-5.250)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
R-Squared	0.27	0.28	0.3	0.29	0.3
Observations	1,213	1,213	1,213	1,175	739
Number of gvkey	302	302	302	296	284

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In this study (Table XVIII), I find a positive relationship between SVEP and CEO compensation. This result supports my assertion that performance-based CEO compensation should increase with better firm performance. SVEP rules improve corporate governance mechanisms.

3.7 Conclusion

Option based CEO compensation has grown over the past 30 years. I find that CEO compensation is significantly positively related to corporate cash holdings. I explore whether the ratio of R&D expenditures to sales has an impact on cash holdings and CEO compensation. I divide CEO compensation into three groups: (i) salary and Bonus, (ii) salary+ Bonus+ Stock-based, and (iii) Salary+ Bonus+ Stock+ Option based.

I find all three forms of CEO compensation have a significant positive relationship with corporate cash holdings and institutional ownership. However, CEO compensation (Salary+ Bonus) has a negative and meaningful relationship with the ratio of R&D expenditures to sales. Both equity-based and option-based compensation has a significant positive correlation to R&D expenditures. CEO average total annual compensation remains nearly constant (a 0.46% increase from 2000 through 2016), but equity-based and option-based compensation increase by 57.34%, and 122.71% respectively for the period 2000 through 2016.

CEO annual combined salary and the bonus is higher in old economy firms, where equity and option-based compensation is more elevated in new economy firms. CEO average salary and bonus increase by approximately $29 thousand if firms increase cash to total assets ratio by 10%. For the same level of cash increase, their equity and option-based compensation increase by approximately $215 thousand and $387 thousand. There is a penalty on CEO compensation if cash holding is above the optimum level.

Furthermore, CEO equity-based compensation had a positive but insignificant relationship with cash holdings during the financial crisis (2007-2009). CEOs in new economy firms received less money as compared to other years. CEO option-based compensation had a positive relationship with excess cash during the financial crisis. The firm's performance also improved if they held extra money during the crisis period. CEOs in firms with a balanced board structure policy received less on option-based awards than other firms.

References

Andrikopoulos, Andreas. "Irreversible investment, managerial discretion and optimal capital structure." Journal of Banking & Finance 33.4 (2009): 709-718.

Bates, Thomas W., Kathleen M. Kahle, and René M. Stulz. "Why do US firms hold so much more cash than they used to?" The journal of finance 64.5 (2009): 1985-2021.

Bertrand, Marianne, and Sendhil Mullainathan. "Are CEOs rewarded for luck? The ones without principals are." The Quarterly Journal of Economics 116.3 (2001): 901-932.

Bryan, Stephen, LeeSeok Hwang, and Steven Lilien. "CEO stock-based compensation: An empirical analysis of incentive-intensity, relative mix, and economic determinants." The Journal of Business 73.4 (2000): 661-693.

Bugeja, Martin, Zoltan Matolcsy, and Helen Spiropoulos. "The association between gender-diverse compensation committees and CEO compensation." Journal of Business Ethics 139.2 (2016): 375-390.

Cheng, Yingmei, Jarrad Harford, and Tianming Tim Zhang. "Bonus-driven repurchases." Journal of Financial and Quantitative Analysis 50.3 (2015): 447-475.

Chhaochharia, Vidhi, and Yaniv Grinstein. "CEO compensation and board structure." The Journal of Finance 64.1 (2009): 231-261.

Correa, Ricardo, and Ugur Lel. "Say on pay laws, executive compensation, pay slice, and firm valuation around the world." Journal of Financial Economics 122.3 (2016): 500-520.

Cubbin, John, and Dennis Leech. "The effect of shareholding dispersion on the degree of control in British companies: theory and measurement." The Economic Journal 93.370 (1983): 351-369.

Dechow, Patricia M., and Richard G. Sloan. "Executive incentives and the horizon problem: An

empirical investigation." Journal of accounting and Economics 14.1 (1991): 51-89.

Dharwadkar, Ravi, et al. "Institutional ownership and monitoring effectiveness: It's not just how much but what else you own." Organization Science 19.3 (2008): 419-440.

Dittmar, Amy, Jan Mahrt-Smith, and Henri Servaes. "International corporate governance and corporate cash holdings." Journal of Financial and Quantitative analysis 38.1 (2003): 111-133.

Grinstein and Paul Hribar. "CEO compensation and incentives: Evidence from M&A bonuses." Journal of financial economics 73.1 (2004): 119-143.

Hall, Brian J., and Jeffrey B. Liebman. "Are CEOs really paid like bureaucrats?" The Quarterly Journal of Economics 113.3 (1998): 653-691.

Harford. "Corporate cash reserves and acquisitions." The Journal of Finance 54.6 (1999): 1969-1997.

Jensen, MC. 1986. Agency costs of free cash flow, corporate finance, and takeovers. American Economic Review 76: 323– 329.

Liu, Yixin, and David C. Mauer. "Corporate cash holdings and CEO compensation incentives." Journal of financial economics 102.1 (2011): 183-198.

Meckling, William H., and Michael C. Jensen. "Theory of the firm: Managerial behavior, agency costs and ownership structure." Journal of financial economics 3.4 (1976): 305-360.

Mehran, Hamid. "Executive compensation structure, ownership, and firm performance." Journal of financial economics 38.2 (1995): 163-184.

Mishel, Lawrence, and Jessica Schieder. "CEO pay remains high relative to the pay of typical workers and high-wage earners." Economic Policy Institute. Récupéré le 12 (2017).

Ning, Yixi, Xiankui Hu, and Xavier Garza-Gomez. "An empirical analysis of the impact of large

changes in institutional ownership on CEO compensation risk." Journal of Economics and Finance 39.1 (2015): 23-47.

Srinidhi, B. I. N., Ferdinand A. Gul, and Judy Tsui. "Female directors and earnings quality." Contemporary Accounting Research 28.5 (2011): 1610-1644.

Tosun, Onur Kemal. "The effect of CEO option compensation on the capital structure: a natural experiment." Financial Management 45.4 (2016): 953-979.

Yermack, David. "Do corporations award CEO stock options effectively?" Journal of financial economics 39.2-3 (1995): 237-269.

https://review.chicagobooth.edu/economics/2017/article/never-mind-1-percent-lets-talk-about-001-percent.

CHAPTER FOUR

ENVIRONMENTAL, SOCIAL, AND GOVERNANCE SCORE, FIRM VALUE AND CEO COMPENSATION

4.1 In**troduction**

Investors have traditionally viewed firm performance exclusively through the lens of firm value maximization. Today, people are aware with the consequences of climate change, environmental impacts, and work-life balance. Managers have started to see not only financial performance (ROE, ROA, and Tobin's q) but also ecological scores. They expand their focus to include social responsibility, e.g., resource use, emissions, innovation, shareholder rights, business ethics, human rights, work-life balance, community service, and product safety.

Hart (1995) and Shrivastava (1995) assert that firms can improve their financial performance by improving their social behavior. They provide a theoretical basis for this win-win situation. According to the United Nations (UN) Sustainable Stock Exchange's (SSE) 2015 annual report, SSE expects that all big companies will disclose their Environmental, Social, and Governance (ESG) score by 2030 at the latest. SSE also asserts that a firm's contribution to the environment, economy, and society is more than its financial outcomes (SSE,2015). The tendency to disclose ESG practices is growing. It is not clear whether ESG disclosure adds value to the firm or not. In this chapter, I examine the impact of ESG and board diversity on the firm performance measured by Tobin's q.

Preston and Sapienza (1990) assert that from the broader stakeholder perspective, employees, suppliers, customers, communities, banks, regulatory agents are equally important, on a par with shareholder wealth maximization. Major stakeholders expect firms to maintain a balance between financial performance and environmental and social responsibility.

Three arguments support the stakeholder perspective. First, ESG practice differs from accounting practice, and ESG disclosure provides additional, valuable information to the financial markets. Although ESG disclosure provides non-financial information, it helps market participants better understand the firm's management practices. ESG practice involves manufacturing technology, resource use, raw materials, community, and emission reduction (Durren, Plantiga, and Scholtens, 2016). Thus, in the long term, ESG practice requires enhanced strategic planning.

Second, ESG disclosure improves internal management practices. It leads to a stronger relationship among multiple stakeholders (Dhaliwal, Li, Tsang, &Yang, 2011). Atan, Ruhaya, et al. (2018) find no significant relationship between ESG scores and firm value for Malaysian companies. However, ESG disclosure increases firm value in the long run.

Third, ESG disclosure helps to minimize informational asymmetries between the firm and concerned parties. Furthermore, relationships with stakeholders improve, leading to better performance through consumption, investment, and enhanced productivity. Consumers may prefer products made by firms that consider the environment and community, in addition to the bottom line. Tarmjui et al. (2016) examine these arguments. We hypothesize that a firm with better ESG disclosure will have a higher value.

ESG disclosure helps to improve transparency in the firm’s social, environmental, and governance (Dubbink and Liedekerke (2008) and Li et al. (2014)). Durren et al. (2016) find that institutional investors factor ESG disclosure practices in investment decisions. ESG disclosure minimizes agency problems by encouraging employees, customers, local communities, suppliers, banks, and regulatory agents to engage in transparency (Jo and Kim (2007)). It discourages

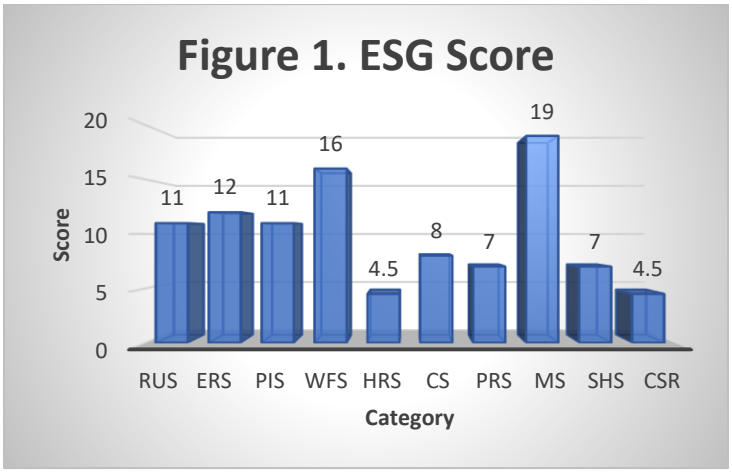
managers from negative behaviors such as pursuing earnings aggressively, and insider trading, among others.

Akerlof (1970) asserts that profitable firms are more likely to disclose more social and environmental information than less profitable ones.

Financial performance encompasses profitability, growth, and market value. Vital performance factors include employee satisfaction, customer satisfaction, environmental performance, environmental audit performance, corporate governance, and social performance.

Managerial training traditionally covers production, financing, accounting, marketing, and human resources—managerial behavior-driven in the context of these fundamental activities. For the CEO and top executives, these activities are necessary, but not sufficient for the firm's health in the long run. The CEO and senior executives must take a more comprehensive view of the firm that includes social and environmental responsibility.

ESG scores are calculated based on ten categories. These ten categories are the ESG Resource use score, the emission reduction score, the product innovation score, the workforce score, the human rights score, the community score, the product responsibility score, the management score, the shareholder's score, and the CSR strategy score. Figure 1 shows these ten categories with their respective scores. Appendix B defines the category scores.

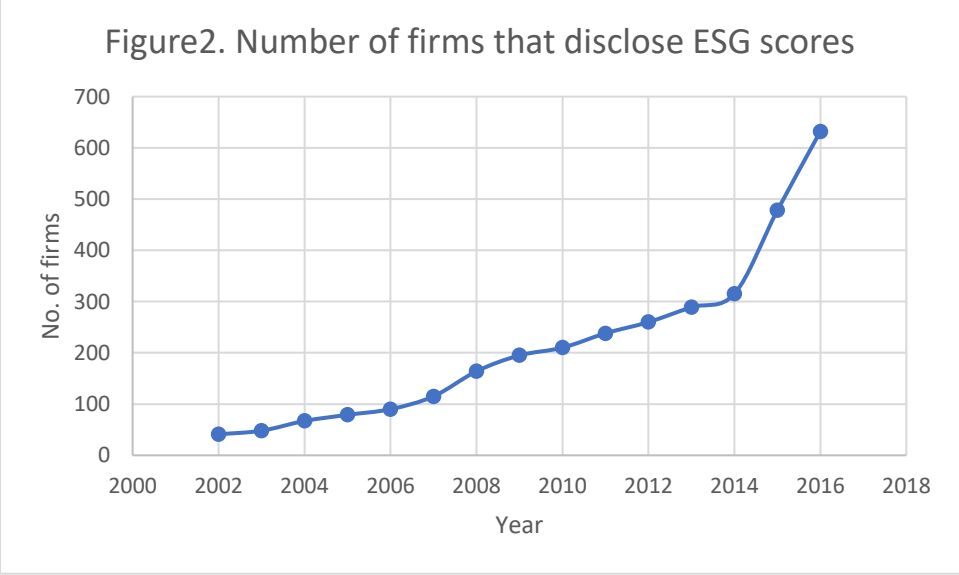


Social scientists are increasingly concerned about global climate change and its impacts. In response, many firms are engaging in and publicly declaring their concern for the environment and "going green." In today's digital world, if companies do not act in an environmentally responsible manner, their contrary practices can be disseminated almost instantaneously. At all levels of society, both business and personal, The Ecological Footprint per person for the US is 8.6 global hectares (gha), more than double Brazil's Footprint average of 3.1 gha, and Mexico's average of 2.6 gha. Thus, the earth would have to have 7.6 times the landmass for the entire world population to consume similarly to American society.

(https://www.google.com/search?ei=TKa8XoHtIpLmsAXq7LfQCQ&q=ecological+footprint+of+usa+today).

4.2 Literature Review and Hypothesis Development

Firms began reporting their ESG related information in 2002. Figure 2 shows the number of US firms that reported the ESG information from 2002 through 2016.



The trend to disclose ESG reports increases exponentially, with significant increases occurring after 2013. Lokuwaduge and Hentaigana (2017) assert that a firm's ESG legitimacy is

a strong motive for ESG disclosure. Brammer and Pavelin (2008) and Higgenson et al. (2006) posit that social media pressure has motivated firms to disclose ESG data to enhance corporate reputation. Consumers may prefer to engage with those firms that disclose their environmental activities.

Xie et al. (2017) investigate the relationship between corporate efficiency and corporate sustainability to determine whether firms are concerned about environmental, social, and governance (ESG) issues. The authors find corporate transparency regarding ESG information has a positive association with organaizational efficiency.

Bennouri et al. (2018) studied 394 French firms for the period 2001 through 2010. They find a significant positive relationship between female directorship and return on assets (ROA) and return on equity (ROE). However, the authors find an insignificant negative link between female directorship and Tobin's q. Khan and Vieito (2013) studied the impact of female CEOs on U.S. firms from 1992 through 2004. They find that the firm risk is smaller in firms with female CEOs than firms with male CEOs.

Cuñat et al. (2016) find that market value increases by 5% if firms adopt a say-on-pay (SOP) policy and their long-term profitability increases. SOP is typically defined as a binary variable equal to one if shareholders can vote on executive pay, and zero otherwise. Reverte et al. (2016) and Wang and Sarkis (2017) find that Corporate Social Responsibility (CSR) is positively associated with firm financial performance. There are two primary reasons why firms devote significant resources to CSR activities. First, managers view better CSR outcomes as an end. Second, they want to improve their corporate image (Clarkson et al. (2011); Christmann and Taylor (2006)).

Reverte et al. (2016) document previous studies showing a conflicting relationship between CSR and firm performance. They note two reasons behind this. First, non-financial outcomes (e.g., company reputation, increased employee motivation, and customer satisfaction) have been ignored. Second, previous studies also neglect improvements through innovation. Improvements in these areas result in better long-run outcomes.

Information asymmetry between the managers and outside investors is another reason for disclosing ESG related information. Sometimes investors undervalue high-performing firms and overvalue poor-performing ones due to a lack of knowledge. Firms are motivated to disclose ESG related activities and information so that investors are better able to judge corporate performance. ESG reveal may cause a competitive benefit to any firm in a rational market where consumers are environmentally and socially sensitive.

O'Rourke (2003) notes that investors may raise their concern on financial and social issues. These concerns reflect consumer interest in economic, social, and environmental performance (Gornaova and Ryan (2014)). Coombs and Gilley (2005) find a negative relationship between executive salaries and the firm's environmental reputation. Cai et al. (2011) and Stanwick and Stanwick (2001) also find a negative correlation between CSR and executive salaries. However, Callan and Thomas (2011) find a positive connection between executive salaries and CSR scores.

Aerts et al. (2008) find that firm disclosure of environmental information positively correlates to corporate financial performance. In addition to ecological disclosure, social and corporate governance disclosure also adds value. Stock returns have a positive and significant relationship with ESG scores (Weber (2014)). Yu et al. (2018) also find a robust positive relationship between ESG disclosure and firm value. There exists a negative correlation between ESG scores and firm value (Lorraine et al. (2004))

Hypothesis 1: Firm value (measured as Tobin's q) is positively associated with ESG score.

I hypothesize that firm performance improves when firms disclose ESG scores. Researchers typically use stock returns as an instrument to measure financial performance. Others use accounting measures such as ROA and ROE. Li et al. (2018), use Tobin's q and ROA to measure the firm value. I use Tobin's q as our benchmark.

Hypothesis 2: The effect of ESG disclosure on firm value is more substantial when the firm has a balanced board structure policy (BBP).

I model BBP as a dummy variable equal to one if the firm has a board diversity policy, and zero otherwise.

Hypothesis 3: ESG controversies are negatively associated with firm value.

ESG controversies are corporate environmental, social, and governance-related news/stories containing suspicious social behavior and product-harm scandals. This negative news quickly attracts stakeholder attention (Cai et al. (2012)), and it raises questions about the firm's prospects and reputation that can damage the firm. ESG controversies measure CSR concerns and evaluate their effect on firm value (Aouadi and Marsat (2018)).

Besides investigating the direct relationship of ESG controversies on firm value, we specify the interaction term between ESG controversies and PSR (product responsibility score). The Product Responsibility Score reflects a firm's capacity to produce safe and high-quality goods and services, integrating the customer's health and safety, integrity, and privacy. The interaction term captures the incremental value of PSR score for firms experiencing ESG controversies.

Hypothesis 4. CEO compensation increases with the improvement of ESG scores.

Velte (2016) examines the sustainable management compensation and ESG scores in the firms registered on the Frankfurt Stock Exchange from 2010 through 2014. He finds a positive

relationship between management compensation and ESG scores. I also posit a positive correlation between CEO compensation and ESG scores.

4.3 Model Specification

I test the hypothesis that ESG disclosure is positively related to firm performance using the following regression models. To check the impact of the BBP (balanced board structure policy) on ESG score and firm value, we use the interaction term ESG*BBP. To examine the effects of ESG scores on firm performance in the new economy, we use an interaction term NEW*ESG, resulting in the following regression specification:

$$Tobin's\ Q_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 ESG_{i,t} * BBP_{i,t} + \beta_3 NEW_{i,t} * ESG_{i,t} + \beta_4 Cash_{i,t} + \beta_5 Size_{i,t} + \beta_6 Lev_{i,t} + \beta_7 R\&D_{i,t} + \beta_8 NWC_{i,t} + \beta_9 Div_{i,t} + + \beta_9 CAPX_{i,t} + \beta_{10} AQC_{i,t} + \beta_{11} CF_{i,t} + \beta_{12} SIGMA_{i,t} + \beta_{13} NEW_{i,t} + \beta_{14} CEOage_{i,t} + \beta_{15} CEO\ Gender_{i,t} + Year\ Effects + Fixed\ effects + Industry\ effects + \varepsilon_{i,t} \dots\dots 1$$

I use the interaction term ESGC*BBP to examine the impact of controversy scores on firm performance. Furthermore, the interaction term NEW*ESGC tests the effects of ESG controversy scores on firm performance in new economy firms. We propose the following model:

$$Tobin's\ Q_{i,t} = \beta_0 + \beta_1 ESGC_{i,t} + \beta_2 ESGC_{i,t} * BBP_{i,t} + \beta_3 NEW_{i,t} * ESGC_{i,t} + \beta_4 Cash_{i,t} + \beta_5 Size_{i,t} + \beta_6 Lev_{i,t} + \beta_7 R\&D_{i,t} + \beta_8 NWC_{i,t} + \beta_9 Div_{i,t} + + \beta_9 CAPX_{i,t} + \beta_{10} AQC_{i,t} + \beta_{11} CF_{i,t} + \beta_{12} SIGMA_{i,t} + \beta_{13} NEW_{i,t} + \beta_{14} CEOage_{i,t} + \beta_{15} CEO\ Gender_{i,t} + Year\ Effects + Fixed\ effects + Industry\ effects + \varepsilon_{i,t} \dots\dots 2$$

I use the following regression model to examine the effects of ESG scores on CEO compensation:

$$CEO\ COMP_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 ESG_{i,t} * BBP_{i,t} + \beta_3 ESG_{i,t} * SVEP_{i,t} + \beta_4 Cash_{i,t} + \beta_5 Size_{i,t} + \beta_6 Lev_{i,t} + \beta_7 R\&D_{i,t} + \beta_8 NWC_{i,t} + \beta_9 Div_{i,t} + + \beta_9 CAPX_{i,t} + \beta_{10} AQC_{i,t} + \beta_{11} CF_{i,t} + \beta_{12} SIGMA_{i,t} +$$

$\beta_{13}NEW_{i,t} + \beta_{14}CEOage_{i,t} + \beta_{15}CEO\ Gender_{i,t} + Year\ Effects + Fixed\ effects +$

$Industry\ effects + \varepsilon_{i,t}$ ……..3

4.4 Sample and Data

I collect the data from the Thompson Reuters database (for ESG scores and CSR sustainability committee data) and COMPUSTAT (for financial data) for the period from 2002 through 2016 to study the relationship between ESG disclosure and firm value. I Winsorize all variables at their first and 99th percentiles to reduce the influence of outliers. My final sample contains 3221 firm-years that reflect 1657 individual firms between 2002 and 2016.

4.5 Result Analysis

4.5.1 Descriptive Statistics

Table I. Descriptive Statistics for Full Sample

Table I. Descriptive Statistics. It includes all the firms. If the firms do not disclose ESG related scores, I replace them with zero scores.

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG	10,620	15.5048	25.3032	0	97.49
ESGC	10,620	13.9300	24.4649	0	77.59
ESGCM	10,620	13.4175	21.9882	0	94.08
PRS	10,620	16.2236	28.3939	0	99.67
CPESG	10,620	0.0911	0.2877	0	1
PRS	10,620	16.2236	28.3939	0	99.67
SVEP	10,620	0.2181	0.4130	0	1
BBP	10,620	0.1560	0.3629	0	1
CG	10,620	22.46765	35.47567	0	98.22
SO	10,620	15.33502	28.21689	0	99.34
CS	10,620	20.29674	33.03159	0	99.77
ES	10,620	14.95702	27.68749	0	99.81
EI	10,620	14.69359	28.46855	0	97.14
EIS	10,620	15.29681	27.17752	0	99.73

Table I describes the descriptive statistics of principal variables. The minimum scores of ESG related variables are zero because I replace these variables with zero if firms do not disclose

ESG related variables. The average combined ESG score is 13.42%, while average ESG and ESG controversy scores are 15.5% and 13.90%, respectively.

Similarly, the average scores on corporate governance (CG) is 16.22%. The average scores on social and community are 15.33 and 20.30 percentage, respectively. EI and EIS are environmental and environmental innovation scores.

Table II. Descriptive Statistics for ESG Firms

Table II. Descriptive Statistics. It includes all the firms that disclose ESG scores.

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG	3,221	51.12116	17.03311	11.44	97.49
ESGC	3,221	45.92886	22.44384	0.22	77.59
ESGCM	3,221	44.23895	15.18219	11.44	94.08
PRS	3,221	53.49096	25.78098	1.25	99.67
CPESG	3,221	0.300217	0.458424	0	1
PRS	3,221	53.49096	25.78098	1.25	99.67
SVEP	3,221	0.719031	0.449542	0	1
BBP	3,221	0.514437	0.499869	0	1
CG	3,221	74.07839	18.05446	1.54	98.22
SO	3,221	50.5613	29.05282	5	99.34
CS	3,221	66.92064	21.84355	1.19	99.77
ES	3,221	49.31499	28.86546	0.25	99.81
EI	3,221	48.44642	32.20309	8.44	97.14
EIS	3,221	50.43532	25.74996	0.18	99.73

When I include only the firms that publish ESG related scores, the average scores on ESG, ESGC, and ESGCM are 51.12%, 45.93%, and 44.23%, respectively. Similarly, the average scores on BBP and CG are 51.44%, and 74.07%, respectively. The average social, community, emission, environmental, and environmental innovation scores are 50.56%, 66.92%, 49.31%, 48.44%, and 50.44%, respectively.

Table III (Panel A). Main Variables Difference by ESG Scores

Table III (Panel A). Here 1 represents the firms that disclose ESG score. Difference ==mean (0)-mean (1). (Salary+ Bonus), Tdc1 and TDc2 are in thousands.

Variable	Mean (0)	Mean (1)	Difference	t-statistics	p-Value
Tobin's Q	1.93	2.09	-0.16	-6.29	0.000
Salary+ Bonus	799.78	946.05	-146.27	-11.6	0.000
Tdc1	3238.16	5992.5	-2754.34	-31.93	0.000
Tdc2	3245.08	6648.97	-3403.89	-30.72	0.000
Cash	0.174	0.135	0.039	11.15	0.000
R&D	0.056	0.034	0.022	6.3	0.000
Ownership	0.77	0.832	-0.062	-15.32	0.000
Age	62.77	58.66	4.11	26.06	0.000

Here Tdc1 and Tdc2 are Salary+ Bonus+ Annual Grants+ Restricted Stock Grants, and Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised, respectively. In Table III, zero represents firms that do not disclose ESG scores, and 1 represents firms that publish ESG scores. The firm's performance (Tobin's Q) is higher in those firms that report ESG scores. The difference is significant at the 1% level. On average, CEO compensation (Salary+ Bonus, Tdc1, and Tdc2) is higher in the firms with ESG scores as compared to the firms without ESG scores.

Table III (Panel B). Main Variables Difference by BBP

Table III (Panel B). Here 1 represents all the firms with balanced board structure policy. Difference=mean (0)-mean (1). (Salary+ Bonus), Tdc1 and TDc2 are in thousands.

Variable	Mean (0)	Mean (1)	Difference	t-statistics	p-Value
Tobin's Q	1.95	2.11	-0.16	-4.59	0.000
Salary+ Bonus	820.59	971.55	-150.96	-9.43	0.000
Tdc1	3606.87	6593.07	-2986.2	-27.11	0.000
Tdc2	3717.53	7291.63	-3574.1	-25.14	0.000
Cash	0.168	0.13	0.038	8.64	0.000
R&D	0.053	0.032	0.021	4.83	0.000
Ownership	0.781	0.835	-0.054	-10.55	0.000
Age	62.13	58.25	3.88	19.13	0.000

Board diversity is vital for firms. The table III (Panel B) shows that firm performance improves with board diversity. Similarly, the firms with BBP hold less cash as compared to firms having no board diversity policy. The result analysis shows that these firms (with board diversity) spend less on research and development than other firms.

Table III (Panel C). Main Variables Difference by SVEP

Table III (panel C). Here 1 represents all the firms with shareholder's voting rights on executive's pay. Difference=mean (0)-mean (1). Salary+ Bonus, Tdc1 and TDc2 are in thousands.

Variable	Mean (0)	Mean (1)	Difference	t-statistics	p-Value
Tobin's q	1.94	2.13	-0.19	-6.41	0.000
Salary+ Bonus	816.03	944.97	-128.94	-9.16	0.000
Tdc1	3404.07	6447.18	-3043.11	-31.38	0.000
Tdc2	3411.34	7363.27	-3951.93	-32.22	0.000
Cash	0.169	0.137	0.032	8.31	0.000
R&D	0.054	0.035	0.019	4.83	0.000
Ownership	0.774	0.841	-0.067	-14.63	0.000
Age	62.47	58.13	4.34	24.57	0.000

In Table III (panel C), we study the impact of shareholders' voting rights on executive pay. We find that firm performance improves with voting rights. As the performance increases, performance-based CEO compensation also increases with this policy. Total institutional ownership even higher in those firms with the shareholders' voting rights.

4.5.2 Multivariate Result Analysis

Table IV. Firm Performance and ESG dummy

Table IV. Here ESGD is a dummy variable equals one if the firms report ESG score and zero otherwise. T-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% significance level, respectively. All variables are defined in Appendix A.

VARIABLES	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
Cash	1.193***	0.828***	1.101***	1.256***	1.251***	1.294***
	(5.340)	(6.202)	(4.993)	(5.528)	(5.485)	(5.683)
Cash^2	-0.694**		-0.599**	-0.756**	-0.753**	-0.766**
	(-2.327)		(-2.034)	(-2.524)	(-2.515)	(-2.558)
ESGD	-0.176***	-0.115***	-0.183***	-0.116***	-0.116***	-0.0855*
	(-5.633)	(-2.952)	(-5.941)	(-3.006)	(-2.976)	(-1.940)
Cash*ESGD		-0.430***		-0.471***	-0.452**	-0.901***
		(-2.583)		(-2.815)	(-2.379)	(-4.037)
Size	0.743***	0.744***	0.813***	0.811***	0.811***	0.809***
	(47.69)	(47.74)	(50.70)	(50.63)	(50.61)	(50.36)
Leverage	1.015***	1.004***	0.924***	0.935***	0.935***	0.925***
	(12.58)	(12.49)	(11.58)	(11.70)	(11.70)	(11.58)
R&D	0.0236	0.0138	-0.00461	-0.0110	-0.0112	-0.0156
	(0.261)	(0.153)	(-0.0518)	(-0.124)	(-0.126)	(-0.175)
R&D*ESGD						0.595**
						(2.231)
NWC	0.904***	0.891***	0.904***	0.906***	0.906***	0.904***
	(7.394)	(7.296)	(7.491)	(7.511)	(7.509)	(7.499)
Dividend	-0.143***	-0.144***	-0.130***	-0.131***	-0.131***	-0.131***
	(-4.730)	(-4.754)	(-4.362)	(-4.378)	(-4.381)	(-4.374)
CAPX	2.494***	2.449***	2.526***	2.498***	2.498***	2.497***
	(9.953)	(9.768)	(10.22)	(10.10)	(10.10)	(10.10)
AQC	-0.0003***	-0.0003***	-0.0003***	-0.0003***	-0.0003***	-0.0003***
	(-8.014)	(-8.335)	(-7.993)	(-8.160)	(-8.147)	(-8.214)
Cash Flow	0.357***	0.360***	0.309***	0.312***	0.312***	0.316***
	(4.822)	(4.860)	(4.216)	(4.265)	(4.265)	(4.320)
Sigma	0.0509	0.0464	0.0482	0.0443	0.0444	0.0405
	(0.721)	(0.657)	(0.693)	(0.636)	(0.638)	(0.582)
Constant	-3.664***	-3.632***	-3.459***	-3.458***	-3.459***	-3.440***
	(-10.03)	(-9.949)	(-9.591)	(-9.594)	(-9.595)	(-9.545)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,062	10,062	10,062	10,062	10,062	10,062
R-squared	0.352	0.352	0.369	0.370	0.370	0.370
Number of gvkey	1,432	1,432	1,432	1,432	1,432	1,432

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table IV shows that firms' performance decreases if the firms report ESG scores. It contradicts our central hypothesis. However, many researchers also find a negative relationship between firm performance and ESG scores. ESGD is a dummy variable equals one if firms report ESG score and zero otherwise. Firm performance decreases by 17.6% in the firms with ESG scores. This result is statistically significant at a 1% significance level. There is a positive impact of ESG scores on firm performance if firms increase R & D expenditures to total sales. Firm performance improves by 5.95% for the increase of 10% on research to sales ratio.

Table V. Firm Performance and ESG Controversy Dummy

Table V. ESGCD is an ESG controversy dummy variable equals 1 if firms report controversy and zero otherwise. T-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% significance level, respectively. All variables are defined in Appendix A.

VARIABLES	Tobin's q	Tobin's q	Tobin's q	Tobin's q	Tobin's q	Tobin's q
Cash	1.193***	0.828***	1.101***	1.256***	1.251***	1.294***
	(5.340)	(6.202)	(4.993)	(5.528)	(5.485)	(5.683)
Cash^2	-0.694**		-0.599**	-0.756**	-0.753**	-0.766**
	(-2.327)		(-2.034)	(-2.524)	(-2.515)	(-2.558)
BBP						-0.0632
						(-1.360)
Cash*BBP						0.554**
						(2.054)
ESGCD	-0.176***	-0.115***	-0.183***	-0.116***	-0.116***	-0.0855*
	(-5.633)	(-2.952)	(-5.941)	(-3.006)	(-2.976)	(-1.940)
Cash*ESGCD		-0.430***		-0.471***	-0.452**	-0.901***
		(-2.583)		(-2.815)	(-2.379)	(-4.037)
R&D*ESGD						0.595**
						(2.231)
Size	0.743***	0.744***	0.813***	0.811***	0.811***	0.809***
	(47.69)	(47.74)	(50.70)	(50.63)	(50.61)	(50.36)
Leverage	1.015***	1.004***	0.924***	0.935***	0.935***	0.925***
	(12.58)	(12.49)	(11.58)	(11.70)	(11.70)	(11.58)
R&D	0.0236	0.0138	-0.00461	-0.0110	-0.0112	-0.0156
	(0.261)	(0.153)	(-0.0518)	(-0.124)	(-0.126)	(-0.175)
NWC	0.904***	0.891***	0.904***	0.906***	0.906***	0.904***
	(7.394)	(7.296)	(7.491)	(7.511)	(7.509)	(7.499)
Dividend	-0.143***	-0.144***	-0.130***	-0.131***	-0.131***	-0.131***
	(-4.730)	(-4.754)	(-4.362)	(-4.378)	(-4.381)	(-4.374)
CAPX	2.494***	2.449***	2.526***	2.498***	2.498***	2.497***
	(9.953)	(9.768)	(10.22)	(10.10)	(10.10)	(10.10)
AQC	-0.0002***	-0.0003***	-0.0003***	-0.0003***	-0.0003***	-0.0003***
	(-8.014)	(-8.335)	(-7.993)	(-8.160)	(-8.147)	(-8.214)
Cash Flow	0.357***	0.360***	0.309***	0.312***	0.312***	0.316***

	(4.822)	(4.860)	(4.216)	(4.265)	(4.265)	(4.320)
Sigma	0.0509	0.0464	0.0482	0.0443	0.0444	0.0405
	(0.721)	(0.657)	(0.693)	(0.636)	(0.638)	(0.582)
Constant	-3.664***	-3.632***	-3.459***	-3.458***	-3.459***	-3.440***
	(-10.03)	(-9.949)	(-9.591)	(-9.594)	(-9.595)	(-9.545)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,062	10,062	10,062	10,062	10,062	10,062
R-squared	0.352	0.352	0.369	0.370	0.370	0.370
Number of gvkey	1,432	1,432	1,432	1,432	1,432	1,432

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table V shows the impact of ESG controversy on firm performance. ESGCD is a dummy variable equals one if the firms report any dispute related to ESG and zero otherwise. With ESG controversy, firm performance decreases by 18.3 %, significantly at a 1% significance level. It supports my hypothesis 3 that firm performance decreases with ESG controversy scores. For such firms, holding extra cash is not beneficial.

Table VI. Firm Performance and Environmental Innovation (EIS) Score

Table VI. Here Tobin's q is the dependent variable. The table examines the impact of environmental innovation and environmental score on firm performance for a different level of ESG scores. Firm value has a positive relationship with EIS when ESG scores lie below 15. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tobin's q Full Sample	Tobin's q ESG>0	Tobin's q 0<ESG<25	Tobin's q 25<ESG<50	Tobin's q 50<ESG<75	Tobin's q ESG>75
EIS	-0.00111	-0.000552	0.0182*	0.000598	-0.00127	0.000438
	(-1.286)	(-0.581)	(1.659)	(0.375)	(-0.764)	(0.150)
ES	-0.00311***	-0.00272***	-0.00333	-0.00233	-0.00210	-0.000812
	(-3.213)	(-2.617)	(-0.441)	(-1.436)	(-1.156)	(-0.177)
Cash	1.187***	1.437***	1.798*	1.088*	0.995	2.567*
	(5.295)	(2.723)	(1.651)	(1.702)	(1.313)	(1.673)
Size	0.491***	0.449***	0.696***	0.560***	0.307***	0.437**
	(21.93)	(9.188)	(3.833)	(7.660)	(4.518)	(2.549)
Leverage	0.464***	0.116	-0.983	-0.426	0.402	2.205***
	(3.881)	(0.505)	(-1.616)	(-1.482)	(1.279)	(3.346)
R&D	0.592**	1.936*	3.948	0.792	3.524***	3.429
	(2.297)	(1.715)	(0.988)	(0.824)	(5.162)	(1.142)
NWC	0.890***	0.633	-0.491	1.124	0.752	-0.380
	(4.210)	(1.297)	(-0.383)	(1.413)	(1.640)	(-0.412)
Dividend	-0.178***	-0.112	0.0687	-0.0330	-0.120	-0.351

	(-4.625)	(-1.424)	(0.256)	(-0.459)	(-1.363)	(-0.404)
CAPX	3.129***	3.689***	6.039***	3.237***	5.374***	4.699
	(8.558)	(4.924)	(2.636)	(4.600)	(3.276)	(1.341)
AQC	-0.00029***	-0.00013***	-0.00021	-0.00011*	-0.00014**	-0.00026***
	(-9.792)	(-4.274)	(-1.477)	(-1.652)	(-2.374)	(-3.065)
Cash Flow	0.629***	0.940***	-0.0825	1.034***	0.955***	4.293**
	(5.811)	(3.748)	(-0.0483)	(2.949)	(2.965)	(2.463)
Sigma	-0.00816	-0.0324*	-1.083**	-0.0850***	-0.000644	-0.332**
	(-0.195)	(-1.809)	(-2.494)	(-3.043)	(-0.0223)	(-2.060)
Constant	-1.619***			-1.621***	-1.832**	
	(-4.742)			(-2.670)	(-2.486)	
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.32	0.35	0.49	0.39	0.44	0.61
Observations	10,062	2,966	140	1,397	1,179	249
Number of gvkey	1,432	647	73	447	314	79

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table VI, we divide the whole samples into different groups based on ESG scores. We find that firm performance has a positive relationship with environmental innovation score (EIS) when firms report ESG and ESG scores are less than 50 and or greater than 75. Similarly, there is a positive relationship between environmental score (ES) and firm performance when firms disclose ESG scores, and their ESG scores are less than 25 and or greater than 75.

Table VII. Firm Performance and EIS by Time Periods

Table VII. Here Tobin's q is the dependent variable. The table examines the impact of environmental innovation and environmental score on firm performance during different periods. There is a positive relationship between firm value and ES for the 2002 to 2006 period. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tobin's q	Tobin's q ESG>0	Tobin's q ESG>0	Tobin's q ESG>0	Tobin's q ESG>0	Tobin's q ESG>0
	Full Sample	2002 -2006	2007 - 2009	2010 - 2012	2013 - 2016	2002 - 2016
EIS	-0.000877	-0.000472	-0.000553	-0.000629	-0.000675	-0.000552
	(-1.084)	(-0.176)	(-0.386)	(-0.496)	(-0.694)	(-0.581)
ES	-0.00282***	0.00154	-0.00139	-0.0068***	-0.00445***	-0.00272***
	(-2.902)	(1.159)	(-0.810)	(-4.478)	(-3.250)	(-2.617)
Cash	1.194***	-0.182	0.873	0.323	1.924***	1.437***
	(5.647)	(-0.205)	(1.050)	(0.460)	(3.494)	(2.723)
Size	0.461***	0.698***	0.229***	0.428***	0.421***	0.449***
	(22.03)	(5.015)	(2.855)	(5.977)	(8.985)	(9.188)
Leverage	0.475***	0.262	-0.307	-0.549*	-0.507*	0.116
	(4.064)	(0.322)	(-1.034)	(-1.753)	(-1.910)	(0.505)
R&D	0.585**	1.483	0.504	0.898	1.395	1.936*
	(2.238)	(1.068)	(0.389)	(0.768)	(0.951)	(1.715)
NWC	0.708***	1.933**	1.356	0.813	0.235	0.633
	(3.512)	(2.316)	(1.575)	(1.352)	(0.539)	(1.297)
Dividend	-0.155***	-0.0957	0.0415	-0.00412	-0.268***	-0.112
	(-4.028)	(-0.355)	(0.249)	(-0.0450)	(-2.827)	(-1.424)
CAPX	3.051***	3.575***	0.545	1.526*	2.530***	3.689***
	(8.409)	(2.894)	(0.630)	(1.728)	(3.729)	(4.924)
AQC	-0.00027***	8.10e-05	-0.00037***	-8.07e-05*	-0.00012***	-0.00013***
	(-9.452)	(0.899)	(-2.651)	(-1.802)	(-2.821)	(-4.274)
Cash Flow	0.624***	1.441*	0.568	0.421	0.201	0.940***
	(5.651)	(1.910)	(1.132)	(0.900)	(1.000)	(3.748)
Sigma	-0.00697	-0.495***	-0.0698***	-0.0668**	-0.0433***	-0.0324*
	(-0.184)	(-9.380)	(-4.479)	(-2.503)	(-3.784)	(-1.809)
Constant			0.680	-1.450**	-1.149***	
			(0.959)	(-2.296)	(-2.636)	
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.32	0.58	0.52	0.43	0.36	0.35
Observations	9,706	291	425	456	1,337	2,966
Number of gvkey	1,378	90	187	247	627	647

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table VII, we divide the whole samples into different sub-samples based on periods. The first column represents all samples. The second to the sixth column are for the firms that disclose ESG scores. We do not find any significant relationship between environmental

innovation score and firm value. However, we examine a negative and significant relationship between ecological score and firm value during most periods. There is a positive relationship between firm value and ES for the 2002 to 2006 period.

Table VIII. Firm Performance and Social Score (SO)

Table VIII. Here Tobin's q is the dependent variable. The table examines the impact of Social score (SO) and community score (CO) on firm performance for a different level of ESG scores.T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tobin's q Full sample	Tobin's q ESG>0	Tobin's q 0<ESG<25	Tobin's q 25<ESG<50	Tobin's q 50<ESG<75	Tobin's q ESG>75
SO	-0.00403***	-0.00435***	-0.00139	-0.00490**	-0.0043***	-0.00176
	(-3.387)	(-3.564)	(-0.188)	(-2.527)	(-2.591)	(-0.348)
CS	-0.00131*	-7.64e-06	-0.000238	0.00117	-0.00116	-0.000869
	(-1.689)	(-0.00790)	(-0.0532)	(0.927)	(-0.747)	(-0.249)
Cash	1.204***	1.467***	1.912	1.118*	0.960	2.573*
	(5.374)	(2.771)	(1.616)	(1.729)	(1.276)	(1.684)
Size	0.500***	0.465***	0.749***	0.582***	0.329***	0.452***
	(21.75)	(9.058)	(3.634)	(7.990)	(4.544)	(2.616)
Leverage	0.488***	0.167	-0.866	-0.374	0.471	2.264***
	(4.088)	(0.733)	(-1.573)	(-1.305)	(1.594)	(3.185)
R&D	0.597**	1.958*	3.665	0.797	3.594***	3.383
	(2.339)	(1.678)	(0.899)	(0.828)	(5.095)	(1.128)
NWC	0.884***	0.631	-0.585	1.086	0.801*	-0.348
	(4.175)	(1.283)	(-0.447)	(1.358)	(1.785)	(-0.372)
Dividend	-0.172***	-0.0902	-0.117	-0.00739	-0.0991	-0.328
	(-4.456)	(-1.154)	(-0.580)	(-0.104)	(-1.129)	(-0.371)
CAPX	3.104***	3.683***	5.883**	3.210***	5.337***	4.721
	(8.529)	(4.891)	(2.469)	(4.443)	(3.185)	(1.314)
AQC	-0.00028***	-0.00013***	-0.00028**	-9.42e-05	-0.00014**	-0.00025***
	(-9.682)	(-4.300)	(-2.059)	(-1.403)	(-2.384)	(-2.981)
Cash Flow	0.620***	0.919***	-0.320	1.030***	0.909***	4.241**
	(5.759)	(3.642)	(-0.197)	(2.972)	(2.796)	(2.541)
Sigma	-0.00670	-0.0361**	-0.974**	-0.0825***	0.00632	-0.313**
	(-0.156)	(-2.139)	(-2.567)	(-2.921)	(0.241)	(-2.196)
Constant	-1.707***	-2.074***			-1.950***	
	(-4.924)	(-4.664)			(-2.678)	
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.33	0.36	0.79	0.41	0.43	0.62
Observations	10,062	2,966	140	1,397	1,179	249
Number of gvkey	1,432	647	73	447	314	79

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In Table VIII, firm value has a negative relationship with social scores and community scores. The positive but insignificant relationship exists between firm value and community score when ESG scores lie between 25 to 50. Furthermore, there is a negative and significant correlation between firms' performance and social score (SO) for the full sample and the firms that report ESG scores.

Table IX. Firm Performance and Social Scores by Time Periods

Table IX. Here Tobin's q is the dependent variable. The table examines the impact of the social score (SO) and community score (CS) on firm performance during different periods. There is a positive relationship between firm value and SO for the 2002 to 2006 period. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tobin's q Full Sample	Tobin's q ESG>0 2002 - 2006	Tobin's q ESG>0 2007 - 2009	Tobin's q ESG>0 2010 - 2012	Tobin's q ESG>0 2013 - 2016	Tobin's q ESG>0 2002 - 2016
SO	-0.00384***	0.000339	-0.00288	-0.00273	-0.00941***	-0.00435***
	(-3.233)	(0.157)	(-1.472)	(-1.433)	(-5.339)	(-3.564)
CS	-0.00104	0.00190	-0.00276	0.000719	-0.00130	-7.64e-06
	(-1.419)	(1.269)	(-1.401)	(0.566)	(-1.126)	(-0.00790)
Cash	1.210***	-0.163	0.952	0.270	1.864***	1.467***
	(5.721)	(-0.190)	(1.140)	(0.374)	(3.469)	(2.771)
Size	0.470***	0.702***	0.247***	0.364***	0.496***	0.465***
	(21.83)	(5.116)	(3.161)	(4.969)	(8.958)	(9.058)
Leverage	0.498***	0.188	-0.267	-0.656**	-0.328	0.167
	(4.267)	(0.234)	(-0.930)	(-2.070)	(-1.269)	(0.733)
R&D	0.590**	1.476	0.525	0.528	1.386	1.958*
	(2.278)	(1.110)	(0.391)	(0.466)	(0.946)	(1.678)
NWC	0.703***	1.897**	1.357	0.798	0.265	0.631
	(3.482)	(2.240)	(1.535)	(1.277)	(0.609)	(1.283)
Dividend	-0.149***	-0.110	0.0780	-0.0313	-0.216**	-0.0902
	(-3.861)	(-0.417)	(0.472)	(-0.336)	(-2.186)	(-1.154)
CAPX	3.025***	3.629***	0.736	1.420	2.527***	3.683***
	(8.387)	(2.902)	(0.845)	(1.591)	(3.754)	(4.891)
AQC	-0.000268***	8.22e-05	-0.000367**	-5.94e-05	-0.000150***	-0.000133***
	(-9.339)	(0.898)	(-2.568)	(-1.305)	(-3.386)	(-4.300)
Cash Flow	0.614***	1.478**	0.556	0.456	0.158	0.919***
	(5.596)	(2.087)	(1.124)	(0.959)	(0.766)	(3.642)
Sigma	-0.00544	-0.514***	-0.0818***	-0.0717***	-0.0463***	-0.0361**
	(-0.140)	(-9.427)	(-5.635)	(-3.199)	(-4.445)	(-2.139)
Constant	-2.070***			-0.998		-2.074***
	(-5.805)			(-1.594)		(-4.664)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.32	0.58	0.53	0.4	0.38	0.36
Observations	9,706	291	425	456	1,337	2,966
Number of gvkey	1,378	90	187	247	627	647

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In table IX, we find a positive relationship between firm value and social scores for all the firms that report ESG scores from 2002 to 2006. In other groups, the association is negative and significant. Furthermore, the community score has a positive and insignificant relationship with the firm value from 2002 to 2006.

Table X. Firm Performance and ESG Scores

Table X. Here Tobin's q is the dependent variable. The table examines the impact of ESG scores on firm performance for a different level of ESG scores. There is a positive relationship between firm value and ESG when ESG scores are higher than 50. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tobin's q Full sample	Tobin's q ESG>0	Tobin's q 0<ESG<25	Tobin's q 25<ESG<50	Tobin's q 50<ESG<75	Tobin's q ESG>75
ESG	-0.00514***	-0.00446**	-0.00208	-0.000873	0.00183	0.000656
	(-4.282)	(-2.361)	(-0.167)	(-0.265)	(0.335)	(0.0350)
ESG*BBP	0.0589	-0.0558	0.441	-0.0355	-0.0409	-0.0340
	(1.190)	(-1.202)	(1.421)	(-0.600)	(-0.604)	(-0.296)
NEW*ESG	-0.00508	-0.00161	0.472*	-0.00602	-0.0365	0.0976
	(-1.366)	(-0.171)	(1.807)	(-0.461)	(-0.957)	(1.243)
Cash	1.130***	1.409***	3.095**	1.016	1.026	2.266*
	(5.054)	(2.670)	(2.536)	(1.587)	(1.333)	(1.671)
Size	0.496***	0.451***	0.727***	0.562***	0.305***	0.446***
	(21.73)	(8.828)	(4.261)	(7.799)	(4.439)	(2.846)
Leverage	0.486***	0.106	-1.035*	-0.453	0.335	2.343***
	(4.058)	(0.469)	(-1.657)	(-1.588)	(1.043)	(3.956)
R&D	0.587**	1.928	0.788	0.649	3.604***	3.217
	(2.258)	(1.632)	(0.181)	(0.679)	(4.791)	(1.015)
NWC	0.913***	0.660	-1.521	1.157	0.743	-0.231
	(4.329)	(1.355)	(-1.200)	(1.453)	(1.583)	(-0.264)
Dividend	-0.172***	-0.105	-0.321*	-0.0220	-0.143	-0.393
	(-4.455)	(-1.337)	(-1.660)	(-0.315)	(-1.617)	(-0.445)
CAPX	3.087***	3.687***	5.457**	3.248***	5.325***	4.493
	(8.495)	(4.885)	(2.416)	(4.624)	(3.407)	(1.528)
AQC	-0.000283***	-0.000122***	-0.000309***	-9.20e-05	-0.00013**	-0.000251***
	(-9.566)	(-3.923)	(-2.601)	(-1.396)	(-2.416)	(-2.985)
Cash Flow	0.630***	0.930***	-2.226	1.026***	0.942***	4.289***
	(5.824)	(3.685)	(-1.194)	(2.910)	(2.949)	(2.662)
Sigma	-0.0115	-0.0340**	-1.272**	-0.0934***	-0.00460	-0.327*
	(-0.265)	(-1.965)	(-2.208)	(-3.332)	(-0.147)	(-1.764)
New	0.251**	0.186	-9.413*	0.582	1.929	-7.882
	(2.535)	(0.382)	(-1.724)	(1.010)	(0.813)	(-1.257)
Age	-0.00631*	0.00207	0.0351	0.00127	0.000636	-0.00417
	(-1.729)	(0.268)	(0.882)	(0.141)	(0.0680)	(-0.205)

Gender	0.0532	0.0829	-0.151	0.112	-0.0337	0.231
	(0.406)	(0.545)	(-0.311)	(0.358)	(-0.176)	(0.668)
Constant	-1.286***	-2.034***		-1.747**		
	(-3.009)	(-3.229)		(-2.257)		
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.32	0.35	0.52	0.4	0.42	0.62
Observations	10,062	2,966	140	1,397	1,179	249
Number of gvkey	1,432	647	73	447	314	79

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table X, we use interaction terms ESG*BBP and ESG*New. I find a positive relationship between firm value and ESG scores for the firms whose ESG scores are higher than 50. Firm performance improves in new economy firms if ESG scores are higher than 75.

Table XI. Firm Performance and ESG Scores by Time Periods

Table XI. Here Tobin's q is the dependent variable. The table examines the impact of ESG scores on firm performance during different periods. There is a positive relationship between firm value and ESG score for the 2002 to 2006 period. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tobin's q Full Sample	Tobin's q ESG>0 2002 -2006	Tobin's q ESG>0 2007 -2009	Tobin's q ESG>0 2010 -2012	Tobin's q ESG>0 2013 - 2016	Tobin's q ESG>0 2002 - 2016
ESG	-0.00455***	0.00181	-0.0118***	-0.00557**	-0.0080***	-0.00446**
	(-4.007)	(0.519)	(-3.000)	(-2.142)	(-3.312)	(-2.361)
ESG*BBP	0.0519	0.00710	0.0695	-0.0478	0.0236	-0.0558
	(1.084)	(0.115)	(0.573)	(-0.869)	(0.434)	(-1.202)
NEW*ESG	-0.00360	0.0398	0.0181**	-0.0161	-0.00255	-0.00161
	(-1.009)	(0.732)	(1.996)	(-1.557)	(-0.390)	(-0.171)
Cash	1.151***	-0.314	1.172	0.201	1.902***	1.409***
	(5.452)	(-0.381)	(1.639)	(0.297)	(3.363)	(2.670)
Size	0.466***	0.727***	0.247***	0.414***	0.427***	0.451***
	(21.80)	(5.086)	(2.594)	(5.880)	(9.176)	(8.828)
Leverage	0.491***	0.201	-0.387	-0.678**	-0.479*	0.106
	(4.183)	(0.257)	(-1.439)	(-2.125)	(-1.833)	(0.469)
R&D	0.581**	1.286	1.207	0.0246	1.314	1.928
	(2.208)	(0.931)	(0.979)	(0.0180)	(0.867)	(1.632)
NWC	0.729***	1.820**	0.579	0.836	0.243	0.660
	(3.611)	(2.221)	(0.679)	(1.389)	(0.568)	(1.355)
Dividend	-0.151***	-0.0729	0.0606	-0.0167	-0.248***	-0.105
	(-3.904)	(-0.274)	(0.399)	(-0.183)	(-2.638)	(-1.337)
CAPX	3.023***	3.875***	-0.120	1.331	2.547***	3.687***
	(8.355)	(3.022)	(-0.120)	(1.399)	(3.742)	(4.885)
AQC	-0.000265***	0.000100	-0.000367*	-6.29e-05	-0.00011**	-0.000122***
	(-9.227)	(1.103)	(-1.736)	(-1.410)	(-2.503)	(-3.923)

Cash Flow	0.623***	1.327	0.558**	0.492	0.204	0.930***
	(5.645)	(1.622)	(2.155)	(1.049)	(1.019)	(3.685)
Sigma	-0.00968	-0.962	-0.0150	-0.0731***	-0.0374***	-0.0340**
	(-0.247)	(-1.576)	(-0.230)	(-2.718)	(-3.026)	(-1.965)
New	0.190*	-1.310	-0.767	1.241	0.279	0.186
	(1.958)	(-0.550)	(-1.414)	(1.573)	(0.646)	(0.382)
Age	-0.00400	-0.0398	-0.00221	0.00296	0.00533	0.00207
	(-1.066)	(-1.238)	(-0.290)	(0.269)	(0.647)	(0.268)
Gender	0.0468	1.105	0.117	-0.0335	-0.0511	0.0829
	(0.362)	(0.906)	(0.532)	(-0.134)	(-0.330)	(0.545)
Constant	-1.448***				-1.384**	-2.034***
	(-3.294)				(-2.251)	(-3.229)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.31	0.57	0.52	0.4	0.36	0.35
Observations	9,706	291	320	456	1,337	2,966
Number of gvkey	1,378	90	183	247	627	647

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table XI shows that firms' performance has a positive relationship with ESG scores from 2002 to 2006. During the same period, if such firms' have a board diversity policy, firms' performance improves. For the new economy firms, if ESG scores increase by 1%, their value grows by 1.81% during the financial crisis.

Table XII. Firm Performance and ESG Controversy Score

Table XII. Here Tobin's q is the dependent variable. The table examines the impact of ESG controversy scores on firm performance for a different level of ESG controversy scores. There is a positive relationship between firm value and ESGC when firms report ESG controversy scores. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tobin's q	Tobin's q	Tobin's q	Tobin's q	Tobin's q
	Full Sample	0<ESGC<15	16<ESGC<30	ESGC>31	ESGC>0
ESGC	-0.000954	0.00163***	0.00392	0.0138	0.00583
	(-1.577)	(3.349)	(0.614)	(1.089)	(1.318)
ESGC*BBP	-0.0302	-0.0645	0.0245	0.267*	-0.100*
	(-0.659)	(-1.425)	(0.267)	(1.731)	(-1.869)
NEW*ESGC	-0.00718**	-0.00436	-0.00786	-0.00476	-0.00449
	(-2.005)	(-0.488)	(-0.710)	(-0.219)	(-0.472)
Cash	1.128***	1.406***	1.237*	1.398	1.355**
	(5.032)	(2.658)	(1.937)	(1.347)	(2.123)
Size	0.479***	0.438***	0.318***	0.387***	0.415***
	(21.99)	(9.041)	(4.772)	(3.461)	(7.746)
Leverage	0.466***	0.0769	0.473	-0.440	-0.135
	(3.895)	(0.338)	(0.827)	(-0.593)	(-0.577)

R&D	0.593**	1.897	0.369	4.154	2.015*
	(2.295)	(1.613)	(0.205)	(1.291)	(1.693)
NWC	0.916***	0.616	0.969	-0.0554	0.678
	(4.302)	(1.262)	(1.591)	(-0.0707)	(1.146)
Dividend	-0.177***	-0.126	-0.375**	-0.324*	-0.0653
	(-4.614)	(-1.584)	(-2.409)	(-1.717)	(-0.843)
CAPX	3.119***	3.670***	3.242**	3.612**	4.125***
	(8.527)	(4.872)	(2.541)	(2.501)	(4.551)
AQC	-0.00029***	-0.00014***	-1.04e-05	-0.00013	-0.00016***
	(-9.852)	(-4.257)	(-0.167)	(-1.495)	(-3.483)
Cash Flow	0.653***	0.923***	1.102	0.275	1.174***
	(6.009)	(3.678)	(1.521)	(0.253)	(3.765)
Sigma	-0.0194	-0.0417**	-0.120	-0.718**	-0.0548***
	(-0.449)	(-2.442)	(-1.327)	(-2.451)	(-2.682)
New	0.269***	0.322	0.740	0.304	0.371
	(2.727)	(0.687)	(0.856)	(0.209)	(0.762)
Age	-0.00542	0.00245	0.000468	0.0148	-0.000875
	(-1.472)	(0.311)	(0.0272)	(0.651)	(-0.113)
Gender	0.0735	0.0877	-0.217	0.206	0.0846
	(0.553)	(0.569)	(-0.603)	(0.850)	(0.536)
Constant	-1.210***				-1.645**
	(-2.860)				(-2.213)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
R-Squared	0.32	0.34	0.46	0.54	0.32
Observations	10,062	2,966	558	219	2,189
Number of gvkey	1,432	647	216	140	615

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XII describes the impact of ESG controversy scores on firm performance. We find that ESG controversy has no significant effect on firm value. However, the firm value increases when ESG scores are less than 15. Aoudi and Marsat (2018) also find positive and significant Firm value (log q) with ESG controversy. We also use an interaction term BBP (board diversity) with ESGC and find a negative correlation between firm value and ESG controversy score. For new economy firms, Firms' value decreases by 0.72% if ESG controversy score increases by 1%.

Table XIII. CEO Compensation (Tdc1) and ESG Scores by Time Periods

Table XIII. Here CEO Compensation (Tdc1) is the dependent variable. The table examines the impact of ESG scores on CEO compensation during different periods. There is a positive relationship between CEO compensation and ESG scores from 2007 to 2009,2010 to 2012, and 2002 to 2016. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tdc1 Full Sample	Tdc1 ESG>0 2002 - 2006	Tdc1 ESG>0 2007 - 2009	Tdc1 ESG>0 2010 - 2012	Tdc1 ESG>0 2013 - 2016	Tdc1 ESG>0 2002-2016
ESG	-9.047*	-19.05	14.06	5.142	-1.390	0.436
	(-1.820)	(-0.838)	(0.758)	(0.302)	(-0.149)	(0.0506)
ESG*BBP	583.5***	1,061	975.7	183.7	-177.1	441.9*
	(2.604)	(1.032)	(1.404)	(0.381)	(-0.635)	(1.904)
NEW*ESG	-20.13**	75.13	-63.11	19.16	17.32	3.022
	(-2.326)	(1.086)	(-1.003)	(0.454)	(0.640)	(0.143)
Cash	2,095***	1,462	5,587	1,097	621.4	1,696
	(4.462)	(0.362)	(1.277)	(0.395)	(0.412)	(1.384)
Size	1,422***	1,599***	1,504***	2,243***	2,013***	1,854***
	(21.66)	(2.847)	(5.085)	(6.505)	(14.05)	(14.84)
Leverage	1,473***	47.78	1,766	1,663	3,865***	3,111***
	(4.297)	(0.0181)	(0.987)	(0.856)	(4.062)	(4.367)
R&D	-420.4**	-554.2	-7,966	-8,461	749.7	897.5
	(-1.965)	(-0.293)	(-1.178)	(-1.463)	(0.459)	(0.611)
NWC	-1,033**	1,297	-3,138	-2,117	-1,390	-1,259
	(-2.264)	(0.332)	(-1.134)	(-1.022)	(-0.999)	(-1.197)
Dividend	-422.2***	696.6	-1,344**	-1,570**	-619.9*	-284.4
	(-3.171)	(0.912)	(-2.248)	(-2.150)	(-1.874)	(-0.967)
CAPX	209.7	13,053	-6,020	-287.1	116.7	657.9
	(0.237)	(1.546)	(-1.065)	(-0.0586)	(0.0445)	(0.333)
AQC	0.337	1.160	1.111	-0.789	0.340	0.163
	(1.514)	(1.016)	(0.940)	(-1.036)	(0.822)	(0.544)
Cash Flow	-2,244***	-4,873	436.4	-3,867	-83.26	-352.1
	(-3.578)	(-1.204)	(0.173)	(-1.038)	(-0.0632)	(-0.404)
Sigma	262.2**	-6,478***	-1,075***	-2,006***	131.1***	298.2***
	(2.556)	(-3.310)	(-3.446)	(-6.045)	(4.795)	(2.752)
New	652.1***	-3,540	3,388	516.5	-1,207	-614.5
	(2.589)	(-0.888)	(1.005)	(0.218)	(-0.856)	(-0.553)
Age	85.90***	206.1***	105.3**	192.8***	86.39***	103.5***
	(9.016)	(3.034)	(2.091)	(3.884)	(3.736)	(4.802)
Gender	-551.4*	1,905	-320.4	17.76	-1,284*	-872.0
	(-1.666)	(0.816)	(-0.243)	(0.0164)	(-1.694)	(-1.416)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.4	0.5	0.47	0.43	0.45	0.4
Observations	9,470	263	313	451	1,334	2,916
Number of gvkey	1,375	83	179	245	627	647

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XIII shows that equity-based CEO compensation (Tdc1) increases with the increase in ESG scores for the periods 2007 to 2009, 2010 to 2012, and 2002 to 2016. Furthermore, we also find that equity-based CEO compensation increases by $441.91 thousand when ESG scores increase by 1%, and firms have a board diversity policy. There is no significant relationship between ESG scores and CEO compensation.

Table XIV. CEO Compensation (Tdc2) and ESG Scores by Time Periods

Table XIV. Here CEO Compensation (Tdc2) is the dependent variable. The table examines the impact of ESG scores on CEO compensation during different periods. There is a positive relationship between CEO compensation and ESG scores from 2002 to 2006. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tdc2 Full Sample	Tdc2 ESG>0 2002 - 2006	Tdc2 ESG>0 2007 - 2009	Tdc2 ESG>0 2010 - 2012	Tdc2 ESG>0 2013 - 2016	Tdc2 ESG>0 2002-2016
ESG	-12.07*	37.10	-0.500	-35.59	-7.868	-2.962
	(-1.752)	(0.962)	(-0.0209)	(-1.179)	(-0.575)	(-0.253)
ESG*BBP	-46.05	-569.3	403.6	165.7	-832.5**	-315.7
	(-0.151)	(-0.486)	(0.506)	(0.213)	(-1.991)	(-1.014)
NEW*ESG	-7.498	-284.5**	-89.74	128.5**	20.63	13.76
	(-0.561)	(-1.993)	(-1.470)	(1.986)	(0.497)	(0.331)
Cash	2,134***	-4,220	6,119	-2,076	-818.5	2,074
	(3.601)	(-0.723)	(1.046)	(-0.464)	(-0.384)	(1.125)
Size	1,632***	2,029***	1,825***	2,809***	2,611***	2,402***
	(21.78)	(3.450)	(4.992)	(5.820)	(11.98)	(13.32)
Leverage	1,686***	553.8	16.87	873.0	4,238***	3,660***
	(3.601)	(0.123)	(0.00908)	(0.312)	(3.752)	(3.952)
R&D	-87.28	5,787	-10,175	-5,893	5,314**	1,519
	(-0.470)	(0.866)	(-1.084)	(-0.605)	(2.131)	(0.767)
NWC	-1,471**	3,907	-1,752	-2,935	-1,148	-2,121
	(-2.177)	(0.683)	(-0.489)	(-0.792)	(-0.645)	(-1.315)
Dividend	-435.4**	2,552	-1,948**	-2,122	-1,266***	-824.0*
	(-2.400)	(1.052)	(-2.170)	(-1.642)	(-2.674)	(-1.917)
CAPX	244.8	10,976	-3,055	-4,516	2,671	1,280
	(0.180)	(1.220)	(-0.328)	(-0.668)	(0.763)	(0.430)
AQC	0.445	0.125	2.296	-1.649	0.309	-0.0187
	(1.435)	(0.111)	(1.184)	(-1.559)	(0.525)	(-0.0446)
Cash Flow	256.7	10,483	753.3	30.18	2,259	3,040**
	(0.720)	(1.005)	(0.250)	(0.00578)	(1.312)	(2.459)
Sigma	343.7*	-8,544***	-1,369***	-2,487***	-736.0***	151.4
	(1.676)	(-4.484)	(-3.742)	(-5.738)	(-17.23)	(0.590)
New	271.7	13,991	5,420	-4,042	-1,357	-1,075
	(0.832)	(1.625)	(1.454)	(-1.152)	(-0.645)	(-0.495)
Age	148.2***	258.8***	165.3**	285.6***	136.0***	173.0***

	(12.15)	(2.786)	(2.417)	(3.436)	(4.163)	(5.616)
Gender	-446.0	1,218	-869.4	47.32	-915.0	-329.7
	(-1.222)	(0.882)	(-0.696)	(0.0360)	(-0.901)	(-0.465)
Constant	-21,885***				-20,595***	-34,882***
	(-12.94)				(-6.503)	(-12.25)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.34	0.42	0.41	0.36	0.38	0.34
Observations	9,614	283	313	451	1,334	2,936
Number of gvkey	1,377	83	179	245	627	647

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Option-based CEO compensation (Tdc2) has no significant relationship with ESG scores. However, board diversity has a positive correlation with CEO compensation (Tdc2). CEO compensation (Tdc2) increases by $403.6 thousand when ESG scores improve by 1% during the financial crisis (2007-2009). In new economy firms, CEO compensation and ESG scores have a positive but insignificant relationship.

Table XV. CEO Compensation (Tdc1) ESG and SVEP by Time Periods

Table XV. Here CEO Compensation (Tdc1) is the dependent variable. The table examines the impact of ESG scores on CEO compensation during different periods. Positive relationship exists between CEO compensation and ESG scores from 2007 to 2009 and 2010 to 2012. I use an interaction term of ESG*BBP and ESG*SVEP. SVEP is a dummy variable equals 1 if the firms have shareholders' voting rights to executive compensation and zero otherwise. T-statistics are in parentheses. All variables are defined in Appendix A.

VARIABLES	Tdc1 Full Sample	Tdc1 ESG>0 2002 - 2006	Tdc1 ESG>0 2007 - 2009	Tdc1 ESG>0 2010 - 2012	Tdc1 ESG>0 2013 - 2016	Tdc1 ESG>0 2002-2016
ESG	-17.53***	-16.94	11.49	36.56	-23.10	-11.79
	(-3.189)	(-0.719)	(0.594)	(0.831)	(-0.662)	(-0.776)
ESG*BBP	595.9***	1,120	923.4	200.6	-160.7	434.0*
	(2.739)	(1.034)	(1.337)	(0.411)	(-0.569)	(1.884)
ESG*SVEP	45.45***	-74.02	23.12	-31.14	22.45	17.39
	(5.214)	(-1.003)	(0.511)	(-0.709)	(0.631)	(1.098)
SVEP	-1,417***	3,932	-868.1	790.7	-1,196	-979.4
	(-3.705)	(1.047)	(-0.391)	(0.411)	(-0.704)	(-1.298)
Cash	1,973***	1,583	5,573	1,229	592.1	1,607
	(4.214)	(0.394)	(1.286)	(0.440)	(0.393)	(1.309)
Size	1,428***	1,652***	1,511***	2,204***	2,013***	1,852***
	(21.90)	(2.758)	(5.079)	(6.465)	(13.98)	(14.73)
Leverage	1,396***	198.6	1,894	1,707	3,882***	3,047***
	(4.164)	(0.0724)	(1.064)	(0.878)	(4.065)	(4.244)

R&D	-406.8*	-715.8	-7,631	-8,623	759.7	943.2
	(-1.911)	(-0.369)	(-1.159)	(-1.489)	(0.465)	(0.643)
NWC	-983.7**	1,431	-3,077	-2,344	-1,370	-1,187
	(-2.165)	(0.361)	(-1.107)	(-1.152)	(-0.984)	(-1.125)
Dividend	-464.8***	676.7	-1,306**	-1,602**	-620.4*	-295.9
	(-3.535)	(0.874)	(-2.176)	(-2.162)	(-1.873)	(-1.002)
CAPX	249.2	13,304	-5,470	-408.9	124.9	659.9
	(0.284)	(1.534)	(-0.946)	(-0.0833)	(0.0476)	(0.333)
NEW*ESG	-20.60**	73.10	-60.76	21.80	17.39	0.997
	(-2.461)	(1.084)	(-0.962)	(0.510)	(0.641)	(0.0474)
New	609.7**	-3,400	3,250	392.9	-1,213	-510.5
	(2.416)	(-0.859)	(0.959)	(0.165)	(-0.859)	(-0.462)
Age	84.09***	208.4***	103.5**	191.8***	86.49***	103.6***
	(8.825)	(3.018)	(1.988)	(3.847)	(3.714)	(4.797)
Gender	-461.0	2,026	-301.0	-14.82	-1,268*	-851.4
	(-1.431)	(0.844)	(-0.225)	(-0.0137)	(-1.667)	(-1.370)
Constant	-13,825***				-18,531***	
	(-10.69)				(-6.291)	
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.41	0.56	0.47	0.43	0.45	0.4
Observations	9,470	263	313	451	1,334	2,916
Number of gvkey	1,375	83	179	245	627	647

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CEO compensation (Tdc1) has a mixed type results with ESG scores at different periods. From 2002 to 2006, 2013-2016, and 2002 to 2016, there is a negative impact of ESG scores on CEO compensation. However, ESG scores have a positive effect on CEO compensation (Tdc1) during the financial crisis (2007-2009). During the financial crisis period, if firms report ESG scores and have shareholders' voting rights, CEO compensation (Tdc1) increases by $23.12 thousand.

Table XVI. Firm performance and ESG Scores by Number of Employees, Total Assets, and Cash Holdings

Table XVI examines the impact of ESG scores on firm performance. I use an interaction term of ESG*BBP, BBP*PRS, NEW*PRS, and NEW*SVEP. SVEP is a dummy variable equals one if the firms have shareholders' voting rights to executive compensation and zero otherwise. T-statistics are in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% significance level, respectively.

VARIABLES	Tobin's q emp<65	Tobin's q emp>65	Tobin's q at<15 B	Tobin's q at>15 B
ESG	-0.000696	0.00581	0.00553*	-0.00375
	(-0.202)	(1.007)	(1.701)	(-0.663)
PRS	0.00155	0.00401	0.000366	0.00482
	(0.743)	(1.523)	(0.198)	(1.642)
ESG*BBP	0.00141	-0.00222	-0.00432	-0.00239
	(0.497)	(-0.524)	(-1.483)	(-0.601)
SVEP	-0.0753	0.0654	0.0283	0.115
	(-0.820)	(0.393)	(0.329)	(0.765)
NEW*PRS	0.0113**	0.00648	0.00734	-0.00192
	(2.555)	(0.405)	(1.481)	(-0.268)
BBP*PRS	-0.00147	-0.000862	0.00328	-0.000768
	(-0.552)	(-0.248)	(1.218)	(-0.232)
NEW*SVEP	-0.192	-0.115	-0.302*	-0.374
	(-1.028)	(-0.311)	(-1.786)	(-1.211)
Cash	1.390***	2.828***	1.975***	-0.119
	(3.991)	(3.811)	(5.896)	(-0.194)
Size	1.195***	0.434***	1.331***	0.19
	(17.45)	(3.858)	(21.23)	(1.47)
Constant	-6.251***	-3.843***	-7.483***	0.137
	(-8.554)	(-2.834)	(-11.71)	-0.0781
Year Effect	Yes	Yes	Yes	Yes
Fixed Effect	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes
Observations	1,000	303	1,003	303
R-squared	0.483	0.44	0.572	0.34
Number of gvkey	264	52	270	56

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table XVI shows that the ESG score has a positive and significant impact on firm value for smaller firms, i.e., under $15 billion. Furthermore, the product responsibility score has a positive relationship with firm value in new economy firms if the number of employees is less than the average number of employees (65).

4.6 Conclusion

In this paper, I investigate the effects of environmental innovation, ESG, and ESG controversy scores on financial performance. We also study the difference in firm performance between the firms that report ESG scores and the firms that do not practice ESG related activities. Results show that better ESG scores are not always necessary for better financial performance. However, better ESG scores are helpful for sustainable development and environmental improvement. If consumers and society become more sensitive to the environment, emissions, human rights, etc., ESG disclosure should enable those firms to perform better.

Our results show that financial performance improved or was less impacted during the financial crisis for those firms that reported ESG scores. However, ESG controversy scores have a positive connection with firm performance. Potential unobserved factors may influence the level of controversies which may affect the relationship between firm value and ESG controversy scores. The firm fixed effects approach was employed to mitigate any endogeneity concerns.

References

Aouadi, Amal, and Sylvain Marsat. "Do ESG controversies matter for firm value? Evidence from international data." *Journal of Business Ethics* 151.4 (2018): 1027-1047.

Atan, Ruhaya, et al. "The impacts of environmental, social, and governance factors on firm performance." Management of Environmental Quality: An International Journal (2018).

Cai, Ye, Hoje Jo, and Carrie Pan. "Doing well while doing bad? CSR in controversial industry sectors." *Journal of Business Ethics* 108.4 (2012): 467-480.

Cai, Ye, Hoje Jo, and Carrie Pan. "Vice or virtue? The impact of corporate social responsibility on executive compensation." Journal of Business Ethics 104.2 (2011): 159-173.

Callan, Scott J., and Janet M. Thomas. "Executive compensation, corporate social responsibility, and corporate financial performance: A multi-equation framework." Corporate Social Responsibility and Environmental Management 18.6 (2011): 332-351.

Coombs, Joseph E., and K. Matthew Gilley. "Stakeholder management as a predictor of CEO compensation: Main effects and interactions with financial performance." Strategic Management Journal 26.9 (2005): 827-840.

Dhaliwal, et al. "Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting." The accounting review 86.1 (2011): 59-100.

Dubbink, Wim, Johan Graafland, and Luc Van Liedekerke. "CSR, transparency and the role of intermediate organisations." Journal of Business Ethics 82.2 (2008): 391-406.

Goranova, Maria, and Lori Verstegen Ryan. "Shareholder activism: A multidisciplinary review." Journal of Management 40.5 (2014): 1230-1268.

Hart, Stuart L. "A natural-resource-based view of the firm." Academy of management review 20.4 (1995): 986-1014.

Jo, Hoje, and Yongtae Kim. "Disclosure frequency and earnings management." Journal of Financial Economics 84.2 (2007): 561-590.

Li, Yiwei, et al. "The impact of environmental, social, and governance disclosure on firm value: The role of CEO power." The British Accounting Review 50.1 (2018): 60-75.

Preston, Lee E., and Harry J. Sapienza. "Stakeholder management and corporate performance." Journal of behavioral Economics 19.4 (1990): 361-375.

Reverte, Carmelo, Eduardo Gomez-Melero, and Juan Gabriel Cegarra-Navarro. "The influence of corporate social responsibility practices on organizational performance: evidence from Eco-Responsible Spanish firms." Journal of Cleaner Production 112 (2016): 2870-2884.

Shrivastava, Paul. "Environmental technologies and competitive advantage." Strategic management journal 16.S1 (1995): 183-200.

Stanwick, Peter A., and Sarah D. Stanwick. "CEO compensation: Does it pay to be green?" Business Strategy and the Environment 10.3 (2001): 176-182.

Tarmuji, Indarawati, Ruhanita Maelah, and Nor Habibah Tarmuji. "The impact of environmental, social and governance practices (ESG) on economic performance: Evidence from ESG score." International Journal of Trade, Economics and Finance 7.3 (2016): 67.

Wang, Zhihong, and Joseph Sarkis. "Corporate social responsibility governance, outcomes, and financial performance." Journal of Cleaner Production 162 (2017): 1607-1616.

CHAPTER FIVE

CONCLUSION

Corporate cash holding has been the subject of a large and growing body of research. The topic attracts financial economists, accountants, psychologists, managers, shareholders, and policymakers because of the power that money wields. If cash is managed correctly, it increases shareholder wealth and benefits all stakeholders, whether connected directly to the firm. If cash is managed poorly, cash reserves may exacerbate agency problems and information asymmetries within the firm. They may be used to harm the environment and increase income inequality in society at large.

These crucial issues motivated this dissertation, and it is from this backdrop that I conducted the three studies contained herein. The first essay documents the impact of cash and excess holdings on firm performance. I observe a positive (negative) association between (excess) cash holdings and firm performance. New economy firms spend more on research and development activities. On average, such firms possess the potential for higher financial distress costs. Firms with greater financial risk hold more cash, supporting the precautionary motive for cash holding. The difference in cash holdings between new and old economy firms is significant at the one percent level.

Board diversity and total institutional ownership are two critical indicators of a well-functioning corporate governance mechanism. My research shows that as overall institutional ownership increases, the governance mechanism improves. As a result, firms hold less cash.

The cash holdings strategy may be different for different firms. Smaller firms (total assets less than $50 billion) have more growth opportunities, preferring to hold more cash. Younger CEOs prefer to keep higher cash balances. I find a negative association between CEO age and

cash holdings for firms whose total assets are less than $1 billion. However, older CEOs prefer to hold more cash in firms with total assets exceeding $100 billion.

The second essay examines the relationship between cash holdings and CEO compensation. My research reveals that CEOs take advantage of cash holdings, and they extract more in incentives. Ironically, holding extra cash reflects negatively on their performance-based compensation. The first essay shows that firm performance degrades as firms hold more money. As a result, CEO performance-based compensation decreases with excess cash holdings.

Institutional ownership has a positive impact on firm performance. Greater institutional ownership is interpreted as a positive signal about the firm's prospects, and it has a positive association with CEO compensation.

Salary and bonus, equity-based, and option-based CEO compensation increased by 0.46%, 57.34%, and 122.71%, respectively, from 2002 through 2016. Results suggest that salary and bonus are higher in old economy firms, while equity and option-based compensations are higher in new economy firms. If firms increase the cash to total assets ratio by 10%, CEO salary and bonuses increase by a mere $29 thousand. But, equity-based and option-based compensations increase by $215 thousand and $387 thousand, respectively. During the financial crisis period (2007-2009), CEOs in new economy firms received less compensation than other regular business periods.

The third essay examines the impact of environmental innovation, ESG, and ESG controversy scores on cash holdings, firm performance, and CEO compensation. The results show that better ESG scores are not always necessary for better firm performance. However, higher ESG scores are helpful for sustainable development and environmental protection. As consumers and society become more sensitive to the environment, global warming, emissions, human rights,

etc., ESG disclosures should help socially responsible firms to do better in the future. The results also indicate that firms that report ESG scores may be less impacted by financial crises.

ESG disclosure enhances the performance of smaller firms. Firm performance increases by 0.55% if smaller firms (total assets less than 15 billion) improve ESG scores by 1 unit. Product responsibility scores are also crucial for better performance. For new economy firms, performance improves with improvement in product responsibility scores. The increase is more pronounced when their ESG scores are less than 25. Firm performance improves by 1.81% in new economy firms if they can enhance ESG scores by one percent. The improvement is more pronounced for firms whose ESG scores are less than 25.

This dissertation highlights the importance of strategic policy for holding cash. However, top executives and CEOs must be aware of the adverse effects of excess money on firm performance and incentives. Although better ESG scores do not improve firm performance in a substantial, direct manner, firms must practice a sustainable development strategy. As consumers and society become more aware of the consequences of managerial actions, the modern firm must spend more on environmental protection, community development, and social awareness.

I predict, without any direct justification, that in the end, financial performance, social recognition, and community respect will become equally important for the well-being of all firms. During climate change, income inequality, and pandemic, it will be paramount.

APPENDIX A

Variable Descriptions

Cash holdings	Cash holdings is the ratio of cash plus cash equivalents to total assets ($ Millions).
Cash^2	Squared of cash holdings.
Tobin's Q	Market value of assets (market value of equity plus total liabilities) over book value of assets.
Size	Log (1+market value of equity)
NWC	Net working capital scaled by total assets, a proxy for liquidity demand and substitute for cash.
R&D	Research and Development spending over total sales, a proxy for growth opportunities.
AQC	Acquisition expenditures divided by total assets, a proxy for investment opportunities.
Leverage	sum of long- term debt and current liabilities, divided by total assets, a proxy for financial distress.
Cash Flow	EBITDA minus interest expense minus taxes minus ordinary dividends to total assets.
CAPX	Capital Expenditures to total assets.
Intangible	Intangible assets to total assets.
Dividend	It equals one if the firm paid a dividend in that year, and zero otherwise.
Sigma	Industry cash flow risk defined as the mean of the ratio of the standard deviations of cash flows to total assets over 20 years for firms in the same industry (by 2-digit sic code).

Age	Present age of CEO in years.
Age^2	Squared of the present age of CEO.
Gender	CEO Gender equals one if CEO is male, and zero otherwise.
Ownership	Total institutional ownership in percentage of market capitalization.
NEW	Equals one if SIC codes are :3570, 3571, 3572, 3576, 3577, 3661, 3674, 4812, 4813, 5045, 5961, 7370, 7371, 7372, and 7373, and zero otherwise.
BBP	Equals one if the firm has balanced board structure policy and zero otherwise.
CEOBM	Equals one if CEO is also a board member, and zero otherwise.
SVEP	equals 1 if Shareholder's voting rights on executive pay, and 0 otherwise.
Salary + Bonus	CEO Compensation (Salary+ Bonus), $ thousand.
Tdc1	Salary+ Bonus+ Annual Grants+ Restricted Stock Grants
Tdc2	Salary+ Bonus+ Other Annual+ Restricted Grants+ LTIP+ All other+ Value of Options Exercised
ESG	Environmental, Social and Governance Score
ESGC	ESG Controversy score
EIS	Environmental Score
SO	Social Score
CG	Corporate Governance Score
CPESG	Equals 1 if firms have ESG related compensation policy and 0 otherwise.
CS	Community Score
ES	Emission Score
PRS	Product responsibility Score

APPENDIX B

Category Scores. The table below lists the category scores and their definitions:

(Resource: Thomson Reuters EIKON ESG Score)

	Score	**Definition**
Environmental Score (34%)	Resource Use (11%)	The Resource Use Score reflects a company's performance and capacity to reduce the use of materials, energy, or water, and to find more eco-efficient solutions by improving supply chain management.
	Emissions Reduction (12%)	The Emission Reduction Score measures a company's commitment and effectiveness towards reducing environmental emissions in the production and operational processes.
	Innovation (11%)	The Innovation Score reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.
Social Score (35.5%)	Workforce (16%)	The Workforce Score measures a company's effectiveness towards job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities and development opportunities for its workforce
	Human Rights (4.5%)	The Human Rights Score measures a company's effectiveness towards respecting the fundamental human rights conventions.
	Community (8%)	The Community Score measures the company's commitment towards being a good citizen, protecting public health and respecting business ethics.

	Product Responsibility (7%)	The Product Responsibility Score reflects a company's capacity to produce quality goods and services integrating the customer's health and safety, integrity, and data privacy.
Governance (30.5%)	Management (19%)	The Management Score measures a company's commitment and effectiveness towards following best practice corporate governance principles.
	Shareholders (7%)	The Shareholders Score measures a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices.
	CSR Strategy (4.5%)	The CSR Strategy Score reflects a company's practices to communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes.

APPENDIX C

(i) Environmental Pillar Categories (100) = Resource use (32.35 %), Emission reductions (35.30%), and product innovation (32.35%).

(ii) Similarly, Social Pillar categories (100) = Workforce (16/35.5 =45.07%), Human Rights (4.5 /35.5=12.67%), and Community (8/35.5=22.54%), and product responsibility (7/35.5=19.72%).

(iii) And Corporate Governance pillar categories (100) = Management (19/30.5=62.30%), Shareholders (7/30.5=22.95%), and CSR Strategy (4.5/30.5=14.75%).

(Resource: Thomson Reuters EIKON ESG Score)

APPENDIX D

ESG Controversy Score. (Resource: Thomson Reuters EIKON ESG Score)

Category	Label (Controversy)	Description
Community	Anti-competition	Number of controversies published in the media linked to anti-competitive behavior (e.g., anti-trust and monopoly), price-fixing or kickbacks.
	Business ethics	Number of controversies published in the media linked to business ethics in general, political contributions or bribery and corruption.
	Intellectual property	Number of controversies published in the media linked to patents and intellectual property infringements.
	Critical countries	Number of controversies published in the media linked to activities in critical, undemocratic countries that do not respect fundamental human rights principles
	Public health	Number of controversies published in the media linked to public health or industrial accidents harming the health and safety of third parties (non-employees and non-customers).
	Tax fraud	Number of controversies published in the media linked to tax fraud, parallel imports, or money laundering.
Human Rights	Child labor	Number of controversies published in the media linked to use of child labor issues.
	Human rights	Number of controversies published in the media linked to human rights issues.
Management	Management compensation	Number of controversies published in the media linked to high executive or board compensation.
Product Responsibility	Consumer	Number of controversies published in the media linked to consumer complaints or dissatisfaction directly linked to the company's products or services.

	customer health and safety	Number of controversies published in the media linked to customer health and safety
	privacy	Number of controversies published in the media linked to employee or customer privacy and integrity.
	product access	Number of controversies published in the media linked to product access.
	responsible marketing	Number of controversies published in the media linked to the company's marketing practices, such as over-marketing of unhealthy food to vulnerable consumers.
	responsible R&D	Number of controversies published in the media linked to responsible research and development (R&D).
Resource Use	Environmental	Number of controversies related to the environmental impact of the company's operations on natural resources or local communities.
Shareholders	Accounting controversies	Number of controversies published in the media linked to aggressive or non-transparent accounting issues.
	Insider dealings	Number of controversies published in the media linked to insider dealings and other share price manipulations.
	Shareholder rights	Number of controversies published in the media linked to shareholder rights infringements.
Workforce	Diversity and opportunity	Number of controversies published in the media linked to workforce diversity and opportunity (e.g., wages, promotion, discrimination, and harassment).
	Employee health & safety	Number of controversies published in the media linked to workforce health and safety.
	Wages or working condition	Number of controversies published in the media linked to the company's relations with employees or relating to wages or wage disputes.

	Management departures	Has an important executive management team member or a key team member announced a voluntary departure (other than for retirement) or been ousted?

BIOGRAPHICAL INFORMATION

EDUCATION

Ph.D., Finance, UT Arlington, USA (2015-2020)

ME, Computer Engineering, Pokhara University, Nepal (2006-2010)

DOCTORAL DISSERTATION

Excess Cash holdings, Firm Performance, and CEO Compensation

RESEARCH INTEREST

Corporate Finance, Corporate Governance, Behavioral finance, ESG, ESG Controversy, CSR Responsibility, Social responsibility, Artificial Neural Network

ACADEMIC EXPERIENCE

Adjunct Assistant Professor, UT Arlington (Sep 2019-May 2020)

Visiting Adjunct Assistant Professor, UT Arlington (Jun 2019- Aug 2019)

Instructor, UT Arlington (Sep 2016- May 2019)

Associate Professor, Nepal Engineering College (NEC), Nepal (Sep 2012-Aug 2015)

Visiting Associate Professor, Kathmandu University, Nepal (June 2014- July 2015)

PROFESSIONAL EXPERIENCE

Head, Electrical Department, NEC, Nepal (Aug 2011- June 2014)

Chief, Student Welfare Division, NEC, Nepal (Jan 2006- Sep 2009)

HONORS AND AWARDS

Michael and Amy Bull Endowed Fund Scholarship (2019-2020)

Enhanced Graduate Teaching Assistantship, UT Arlington (2015-2019)

Erasmus Mundus Scholarship, University of Sannio, Italy (2010)